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THE

INDIAN FORESTER.

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A Tour in Jaunsar.

Thadiar Suspension Bridge.—The Tons is crossed at Thadiar by a suspension bridge, which was built by the Forest Department in 1875 at a cost of Rs. 2,864. It was repaired in 1878-79 at a cost of Rs. 503. The following description of the bridge is taken from the Journal of 1891 :—

"The distance between the uprights is 164 feet, the uprights are 12 feet apart and 15½ feet high. The bridge itself is 7 feet wide. The two cables which support the bridge are 5 inches in girth. The suspensors are 1 inch in circumference ; they are passed through the large cables to prevent them from slipping ; the lower ends of the suspensors are fastened to the cross beams which carry the longitudinal beams, on which the planking rests. Five transverse beams in the middle of the bridge rest on the cables and two others are just under it.

The bridge was originally given a camber of 1 foot to allow for the stretching of the ropes. Railings are placed on either side of the bridge consisting of wooden uprights and wires stretched horizontally. The planks of the roadway are 7 feet long by 6 in. by 2 in. and planks ½ in. thick and 2 feet wide are nailed over these in the centre of the roadway where most of the traffic falls.

Three masonry abutments have been built over the anchorage of the bridge on the left bank to protect it from earth slips.

The cables are fixed to Deodar logs placed horizontally, buried in the ground and kept in position by 2 Sissu logs driven into the ground at an angle of 70 degrees over the Deodar log. The end of the cables are frayed out and nailed on to the Deodar logs."

The Wet Slide and the Sledge road.—Formerly the sleepers were conveyed to the Tons partly by means of a wet slide, partly by a sledge road. The former was totally destroyed in the great

flood of the 10th August, 1889, and not a vestige now remains. For an account of this flood, see *Indian Forester*, Vol XV, p. 293.

The following description of the wet slide, a model of which may be seen at the Forest School, may be given here for reference, although it is extremely unlikely that any more will be constructed, the sledge road having proved superior in every way :—

"The slide, which is 12,192 feet in length, was constructed during 1876-78 at a cost of Rs. 26,000, whilst up to the end of March, 1885, Rs. 7,988 have been spent on repairs. The gradient varies from 5 to 22 degrees, the best gradient being about 15 degrees, and the total fall is 1,300 feet. It consists of a trough composed of three beams, 12 feet by 13 in. by 5 in., roughly jointed and firmly wedged into block sleepers. These beams, which are of chir, have been found only to last three or four years at the longest, so that the entire slide has had to be reconstructed more than once It would have been much cheaper in the end to have made it of deodar, as this wood lasts indefinitely in the hills, whilst chir rots in two or three years when exposed to alternations of heat and moisture. The inside measurement of the slide is 13 inches wide by 8 inches high, as it was originally constructed for the sliding of broad-gauge sleepers; for metre-gauge sleepers, a lighter slide would suffice. There are in all eight main bridges varying from 30 to 70 feet in length, as well as several heavy rock-cuttings and retaining walls 20 to 25 feet high. The slide is worked by means of a good flow of water, which is let in from the Bagiar nala by means of troughs situated about a quarter of a mile apart, very little water being required when the gradient is of 22 degrees, but a plentiful supply of water being absolutely necessary when it is less than 18 or 20 degrees. The slide is principally worked during the rains, as there is not sufficient water available at other seasons, except during February, after the melting of the snow. With a good supply of water, a sleeper takes about ten minutes travalling down the slide, and 1,200 sleepers can be slid in one working day of 10 or 12 hours. On arrival at the Thadiar depôt on the banks of the Tons, the sleepers are thrown out of the slide by means of a kind of table provided with a slanting beam against which they strike, and they are then stacked. After the monsoon or during February, the sleepers are slid directly into the Tons, but this cannot be done during the floods. Since its completion to the end of March, 1885, 407,800 sleepers, of which 135,000 were broad-gauge, have been exported by its aid; the saving thus effected has been estimated at Rs. 15,014."

When the slide was destroyed, it was not considered advisable to construct another owing to the great expense and difficulty in working, and a sledge road similar to the existing one in the Deota forest was made in its place. It has been fully described in Mr. Mc'A. Moir's report of 1891.

The sledge road is 7,960 feet in length and is constructed of two rows of longitudinal beams of chir pine, 10 to 12 feet long 4½ in. by 4 in. and placed 34 in. apart. On to these beams are notched cross pieces 5 feet by 4 in. by 4 in. placed 24 in to 33 in. apart according to the slope. In these cross pieces, which are made of rejected deodar sleepers, are cut the slots which serve as guides for the sledges. The slots are ½ inch deep, from 6 in. to 7 in. wide, and 30 in apart from centre to centre. The cross pieces besides being notched, are also fastened by Moru oak trenails.

Where the gradient of the sledge road is less than 6 degrees, the cross pieces are placed 24 inches apart so that the sledge rests on three cross pieces at one time ; where the gradient is more than 6 degrees the cross pieces are placed 30 inches apart and the sledge rests on 2 cross pieces only at the same time. It has been found that the sledge runs more easily on low gradients, when the cross pieces are placed closer to each other

The sledges do not run easily unless the sledge road is quite dry. In order to decrease the friction, a mixture of soap and mustard oil is applied to the slots of the cross pieces. This is cheaper than ghee, and is nearly as effective ; the mixture is applied where required by a boy who precedes the sledges ; where the gradient is too steep, the progress of the sledge may be stop ed by the application of a little sand

On the inner side of the sledge road is a good drain so as to keep the sledge road as dry as possible. The accumulated water is taken under the sledge road in box drains where necessary. The drier the metalling in which the longitudinal beams are laid the more lasting will they be.

Moru would be more suitable than Deodar on low gradients, as its grain is smoother but it has not yet been used on account of the greater expense in cutting it up. Chir would probably be better than Deodar on the steeper gradients, as its grain is rougher than Deodar, but it is not so lasting.

The sledges are similar to those used on the Deota sledge road ; they consist of two runners made of seasoned Moru Oak placed 28 inches apart, strengthened by two or three wooden struts, and carrying six uprights, and two handles. The runners are 10 feet 8 in. by 5 in. by 1¾ in. for B G. sleepers, and 9 in. by 5 in. by 1¾ in. for M. G. sleepers ; and when they are worn down to 2 in they are re-soled with pieces of Moru oak. One sledge costs about Rs 10, and carries 20 M G. or 15 B. G. sleepers. Two men work one sledge and they make 4 to 5 journeys a day from the Chabai depôt to the head of the dry shoot ; they are paid 4 as. per sledge of M. G. sleepers, and 6 as per sledge of B. G. Sleepers.

We inspected various bridges along the sledge road, and the students took detailed measurements of bridge No. 10, so as to reproduce a drawing to scale.

Bridge No. 1 over the rice fields is 368 ft. long, with 1 spans of variable length, supported on dry rubble stone piers.

Bridge No. 2 is supported by a huge boulder, the top of which has been blasted to receive the roadway.

Bridge No. 9 is 68 ft. long, and 57 ft. high from the bottom of the khud. It consists of one span and is supported by straining beams and struts.

Bridge No. 15 is 154 ft. long, with a gradient of 7 degrees to 8 degrees, and supported on piers and abutments. The piers are 9 feet by 7½ at the base, tapering to 6 ft. by 5 ft. at the top. There are 5 spans of about 28 feet each. To prevent shaking a T or H shaped trestle is erected below the middle of the beams in each span.

The original cost of the Thadiar sledge road was Rs. 4,534, or about Rs. 3,000 per mile. It has been estimated that the cost of carriage of sleepers for four years on men's backs would have been Rs. 39,000, whereas the cost of construction, sledging, repairs, &c., during the same period would be about Rs. 15,500. There is thus a saving of Rs. 23,500, or nearly Rs. 6,000 a year ; this clearly shews the advantage of the sledge road over ordinary methods of carriage.

When the sleepers arrive at the end of the sledge road—the Thadiar depôt—they are stacked in heaps of 200, and in October and in November are launched into the Tons by means of the timber shoot. The following description is from the Journal of 1891 :—

"The shoot is 333 feet long. It consists of an open trough laid in an exact straight line, the gradient of the upper 234 feet is 42 degrees, that of the lower 99 feet 26 degrees. It is made of Chir pine throughout. The beams of which the trough is constructed are fixed into wooden tressle supports by means of wedges, the whole being bolted together by iron bolts ½ inch diameter.

The inside measurement of the trough is 11½ inches by 8 inches, the scantlings of which it is made being 12 ft. by 10 inches by 4 in.

The upper portion of the shoot is laid in a trench dug out for it ; the lower portion, which is removeable, is supported on strong wooden tressles. These are placed wherever the sides or bottom pieces of the trough are joined. The sides are made to break joint with the bottom piece.

The slide is kept moist, while the sleepers are being launched to decrease the friction and prevent its splintering, water being led from a neighbouring stream to the head of the shoot.

A launching platform has been constructed at the head of the shoot, and the sleepers which are brought down by the sledge road are stacked as near to the head of the shoot as possible.

The sledge road ends on a high bank of boulder and the shoot leads from this into the river Tons."

In one day, about 4,500 sleepers can be launched ; in December 1892, 87,740 sleepers, of which 55,000 were M. G., were launched at a cost of Rs. 243, or nearly ½ a pie per sleeper. Some sleepers of both descriptions were launched in our presence, and they took on an average 7½ seconds to reach the stream ; this is a velocity of 35 miles per hour, allowing 50 feet from the bottom of the shoot to the water.

The Deota deodar forest.—The Deota forest lies in a kind of amphitheatre, bounded by the Lambatach ridge to the west, and the Dhikari dhar to the north and east. The forest forms a portion of the area leased from the Raja of Tehri-Garhwal for Rs. 9,000 per annum, and there are 11 years of the lease yet to run. The area is 4,937 acres, about one-half of which constitutes the deodar zone ; some of it, however, is situated on extremely precipitous ground, and cannot be worked.

The deodar zone in this forest is comprised between 7,000 and 9,000 feet altitude, the forest contains chir in the lower parts, and kharsu oak near the top of the ridge. Spruce, silver and moru are the companions of deodar, with maple, and horse-chestnut near streams. Where some peaks rise above 10,000 feet, as on Rikshin, specimens of *Rhododendron campanulatum* may be found ; it was in flower at the time of our visit, 21st May.

The forest has been divided into 10 blocks with natural boundaries, all drained by the Bagiar stream and its feeders. Fellings began in 1876 in the Partil block to the east of the bungalow, and it took about 12 years to work round westwards through the Temple, Dopta, Jaurasi, Katatach, and Kanga blocks, when fellings began again in the Partil block.

The working plan for the leased forests embraces Deota, Bamsu, Surars, Sahlra, Noranu, Naintwar, Datmir, Lambatach, Kotigad, and Chansil, a total area of 45,198 acres ; and the next forest to be worked will be Bamsu where preparations in the way of making a sledge road, and felling trees are now going on.

Deota has now been worked for 18 years and during that period 17,841 green Deodar trees have been felled, besides dry ones which may be estimated at 2,200, making the total 20,000. The outturn of sleepers, estimated in metre-guage, has been 12,00,000.

Natural reproduction has everywhere been excellent and the natural crop of deodar seedlings has been assisted by girdling operations wherever necessary, and supplemented by planting

As a rule, nursery-raised plants have been put out and generally in plots 10 feet by 10 feet, five seedlings in one plot. The plot is entirely cleared of indigofera, grass, &c, and one plant is

put in the middle and one at each corner. This system has succeeded well in the Partil block in plantation No. 5 of 1881, where the following measurements were made in 1888 :—

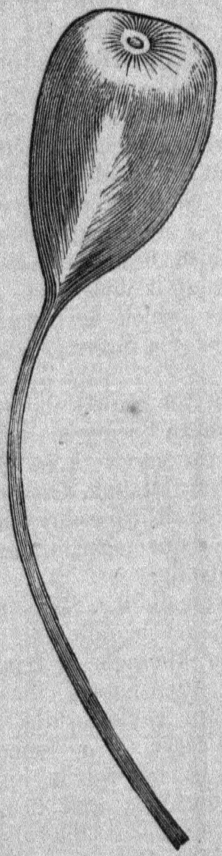
Six hundred and twelve plants had an average height of 3 feet 9 inches, but they included several younger plants, which had been put in as repairs. The average height of 12 of the tallest plants was 6 feet 4 inches. The success of this plantation is 89 per cent.

A small area planted on this system in 1882 contained 92 plots with five seedlings in each, which had an average height of 2 feet 9 inches, in 1888 :—

Girdling operations have been going on in this forest for some time past; the object being to give more light to existing seedlings and to induce more seedlings to come up. We noticed a patch of silver fir thus treated near the Deota temple, but the shade cast by the dead stems is still too great for deodar to prosper underneath. In course of time these dead trees have become rotten and are being blown down, and deodar may soon be successfully underplanted. But these gentle, moist slopes, with a westerly or north-westerly aspect, bearing a dense crop of silver fir, are by their nature not suitable for deodar, and it would be a better policy to confine our attention to slopes where we know deodar will grow well, and to girdle all oaks, spruce, fir, &c., shading existing deodar seedlings, and to plant up all the suitable blank spaces and patches of indigofera. This is being gradually done, and all we suggest here is to leave the silver fir area to the last.

Now that felling operations have come to an end in this forest, the principal point to attend to is giving the young deodar more light, as they require it, by girdling, and for this purpose it would probably be well to go round the forest once in five years. The average length of the annual shoots of deodar seedlings here is about eight inches, so in 5 years they will have grown over three feet in height.

Almost all over the areas already worked, the refuse logs and slabs still encumber the ground, seriously interfering with the reproduction; at any rate on and near the sites of the old sawing pits. It was at one time proposed to utilize this refuse wood in smelting iron, but no iron ore has been found in the neighbourhood. The villagers are allowed to remove free whatever they wish for, but this makes a very small impression on the whole area. Any manufacture which utilizes this refuse material, such as wood-pulp for paper, matches, creosote, &c., would be a great boon. But it is unlikely that any use will be found for this *debris*, and the only plan is to allow it to rot slowly on the ground, a process which will take many years.



SCLEROTIA FROM WHITE ANTS' NEST.

Sclerotia in a White Ants' nest.

A short while ago, Mr. A. E. Lowrie sent from Chanda, C. P. for determination at the Forest School, a strange black club-shaped fungoid mass which he had found in a white ants' nest. It was first referred to Mr. E. C. Cotes who suggested that the growth might be fungoid and drew attention to the remarks upon *Sclerotium stipatium* in the Dictionary of Economic Products: in that work (Vol. VI. ii. 491) Dr. Watt refers to an article in the Journal of the Agri-Horticultural Society to which we have no present access and to one by the late Dr. J. Shortt of Madras in the Journal of the Linnean Society of 1866-67 after reading which we have no doubt of its referring to the same curious growth as that received from Mr. Lowrie.

On a reference to Dr. Geobel's outlines of classification, we find *Sclerotium* defined as " a tuber-like pluri-cellular body, filled 'with nutrient material, which becomes detached when mature 'from the mycelium producing it and after remaining dormant 'for a time puts out shoots which develope into fructification. 'The most common example of a *Sclerotium* is the ergot of rye '(*Claviceps purpureu*).

Dr. Shortt's account of the growth is so interesting that we extract it from the Linnean Society's Journal as follows:—

'Scientific name—Sclerotium (Berk. et Curr).

'Indian name.—1. Púttú Manga, from púttú, a white-ant 'hill, and Manga a mango (fruit); literally white-ant hill mango.

'Syn.—2. Púttú Kái, from púttú, white-ant hill and Kái, 'fruit, —or, white-ant-hill fruit.

'3. Mail Manga, from mail, dry, like sticks, leaves, etc, 'and manga, a mango,—or, dry mango.

'I am indebted to the kindness of Daniel Hanbury, Esq., 'F. L. S., for drawing my attention to the Púttú Manga. I 'have had some experience in exploring the white-ant hills in 'the Madras district, while carrying out some experiments (the 'results of which were to be noticed in an Essay on the de-'structive effects of the White Ant), and in no instance have I 'met with the Púttú Manga; nor is the substance, or its name, 'familiar to the natives of the Carnatic. The fact of its not 'being found in this part of India may be accounted for by the 'great dryness of the climate in this locality, and the absence of 'the moisture and heat so necessary for fungoid growths. On 'the western coast, where it rains for at least six months in the 'year, the conditions favourable for the growth of this fungus 'exist in the burrows or excavations formed by the white ants. 'The natives state that it is occasionally to be met with in dark 'crevices, and in the recesses of rocks and caves: my experience 'does not confirm this latter fact as yet; and the specimens I 'have now the honour of submitting were all procured from the 'white-ant hill, or púttú.

'These fungoid growths are only met with in old and de-
'serted ant-hills, and frequently after the insects have become
'winged: they are found only in the peripheral and more super-
'ficial caverns, springing from their roof, occasionally from the
'floor, never from the cells occupied by the ants themselves.
'Some grow with long stalks, others are sessile; in those having
'stalks, they can, in a few, be traced beneath the soil, while the
'sessile ones seem simply to lie over the soil.

'Messrs Churrey and Hanbury are in unison with Mr.
'Berkeley in the opinion that the Púttú Manga is of fungoid
'growth; of this there can be no doubt from the habit and
'structure as also from the fact that it attains its greatest perfec-
'tion during or immediately after, the rains; and it is possible
'that further research during this particular period may tend to
'discovery of a perfect specimen, with the organs of fructifica-
'tion fully developed. The present specimens were procured in
'the Coimbatore and Malabar districts, in October 1865, and were
'removed, some *in situ* attached to the clod of earth, and others
'loose, from the interior of several white-ant hills, within the
'caverns of which some were found growing in clusters of six or
'more, hanging each by a separate stalk, and others simply over-
'lying the floors of the cells, without stalks. Those taken up
'with the clod of earth soon lost moisture, and crumbled to dust.
'These, on removal, were not quite so black in colour, and have
'shrunk considerably in size; and I should say that they are
'one-third smaller now then when taken out of the white-ant hill.

'They take on a variety of forms, being oval, oblong pyri-
'form, irregularly round, etc. The external rind is black and
'slightly wrinkled, on cutting into it, the interior is found to be
'white and pithy, and is compared by the natives to the kernel
'of a tender cocoa-nut. It is tasteless and inodorous.

'The Malayalum Vythians, who are familiar with the Púttú
'Manga believe it to be manufactured by the insects themselves,
'by a kind of accretive process, and that snakes are very fond
'of it and devour it greedily. Snake-charmers collect the Púttú
'Manga and take it round for sale, and they then give out that
'they keep a supply always on hand to feed their snakes with:
'this assertion I am much inclined to doubt.

'Others say that it is not a vegetable product, but a con-
'glomerated mass of the larvæ of white ants. It is not familiar
'to the generality of natives, and the educated among them are
'not aware of its existence; whereas it is well known to the
'rude villagers, who attribute to it poisonous qualities. The
'various accounts given of its nature and properties differ so much
'that one hardly knows what degree of reliance to place on them.

'The Vythians eagerly seek it, and use it as a remedy in
'cholera, syphilis, and a variety of other diseases. In cholera it
'is prescribed as a specific, by rubbing it up with a little water
'and fresh ginger-juice or country arrack; and the dose is re-
'peated after every motion or act of vomiting.

'The natives who assisted in removing the present specimens 'remarked that they are not full-grown, and that they attain 'the size of an orange during the monsoons. It is not common-'ly found in white-ant hills, but is met with in one out of every 'twenty or thirty on the western coast and Coimbatore district.

'I am indebted to my assistant Mr W. Harvey, for seve-'ral specimens of the Pútú Manga, as well as for such informa-'tion on the subject as he could collect for me in the Coimbatore 'district."

Mr. Lowrie says that in Chanda it is called 'Patha dudhi' and that the natives have an idea that on the formation of a rainbow, the rainbow casts a shadow and this shadow falling on a white ant hill, these fungi are produced. The Sclerotium is used medicinally for women in cases where any difficulty is found during child birth.

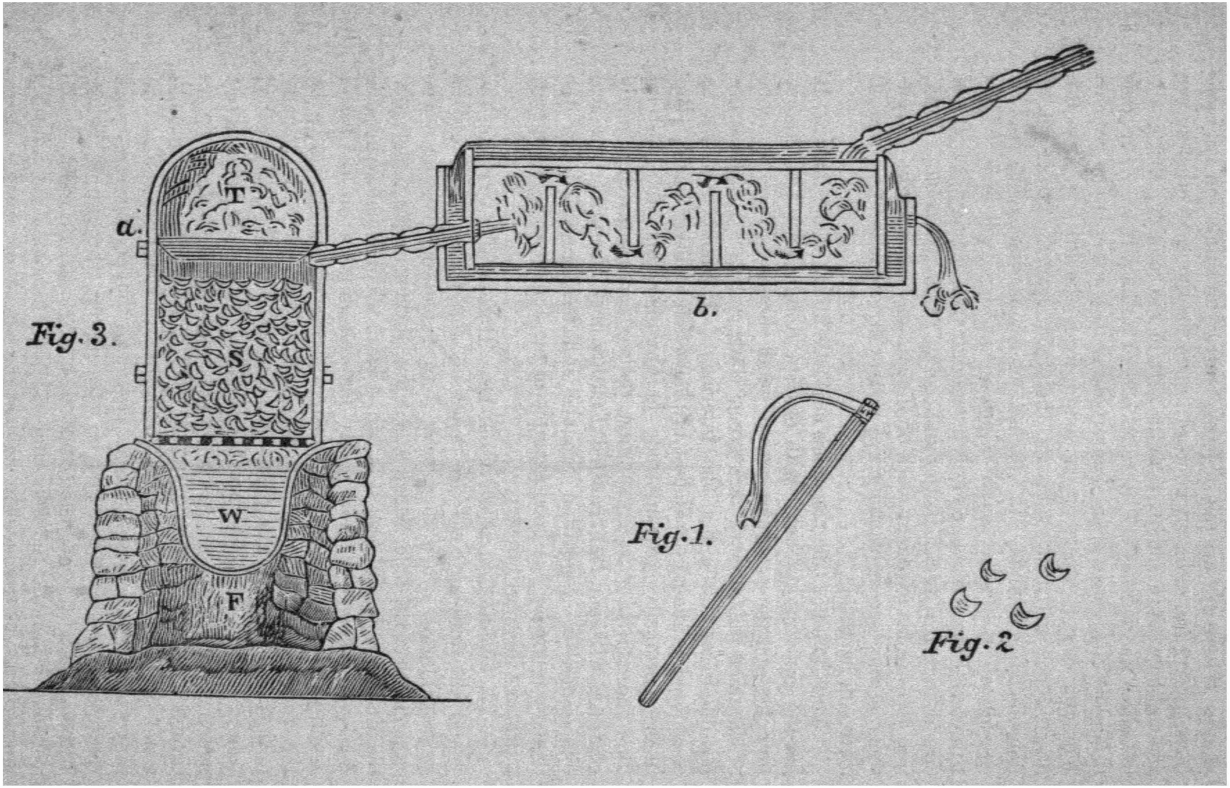
The Camphor Industry in Formosa.

That Camphor is employed against different species of moths of the Tineidæ family in order to prevent them from laying their eggs in woollen clothing and furs and to prevent the damage that follows is known to every child in this country. But whence the Camphor comes, how it is obtained and what its other uses are, must be unknown to many, and so it may perhaps be of interest to our readers to learn from an eye witness, what it is and whence it comes, all the more that it is one of the principal forest products which is of importance to man. *What is Camphor?* Camphor with the chemical formula C_{10} $H_{16}O$ is an etherial oil which is found in the wood of the Camphor tree (*Camphora officinalis*) when treated so as to remove the oxygen. Its specific gravity is 0·98 it melts at 175 degrees C. and sublimes at 204 degrees, is colourless, crystalline, aromatic, rotates in pure water, burns into a strong flame and is soluble in alcohol. Besides the kind we are about to describe which is almost exclusively used in Europe, there is another kind which has long been known in Eastern Asia, the Baros or Borneo Camphor, named after a town Baros on the North-West coast of Sumatra. This kind is obtained from the giant stems of the *Dryobalanops Camphora* especially in Sumatra and Borneo and is much used in those regions in religious and other ceremonies for incense. It comes, however, very little into the trade, because the demand in Eastern Asia is very large in proportion to the production and therefore we may leave it out of account. When we speak of camphor in these pages it must be understood that we refer to the produce of the *Camphora officinalis*. It should be mentioned however that the Baros Camphor fetches eighty times as high a price in the Chinese market as the product obtained from the Camphor tree.

Whence is Camphor obtained? The chief countries in which it is produced are China and Japan. In Japan, it is found chiefly in the hill country on the sea coast southwards from the 30th degree of North Latitude up to the Island of Kinshin and Shikoku where the Camphor tree (Kusu-no-ki in Japanese,) adorns the evergreen subtropical forests. In China it is produced in the Central closed region, especially in the middle provinces whence the Camphor Wood chests so much in use in those regions are obtained, but the Camphor itself is hardly produced in sufficient quantity to be able to come into foreign trade. The island of Formosa, on the other hand, which is separated by the straits of Fokien from the continent and lies south of the Tropic of Cancer and measures 38,803 square kilometers, is the chief country of the production and export of Camphor. Formosa is counted politically as a part of the Chinese Province of Fokien which lies opposite it, although the Western side of the island has been practically taken away from the Chinese on account of the long continued fight with the aborigines, which is still going on. The island is divided into halves through one of its lengths by the Ta Chan mountains which run from North to South The western half inclines to the sea in terrace-like slopes and this gives the name to the chief town Taudan, while on the eastern side, the mountains run done to the sea in steep rocks washed by the waves of the ocean. On the western side, the men of the long pigtail have since they arrived from China, two centuries ago, established themselves and driven back the wild races and the primeval forest. On broad areas the rice fields cultivated and watered with painful care are seen extending themselves and more lately the culture of the tea plant also at the cost of the primeval forest has made such progress that for some time past a large colony of Europeans has established itself in Twatutia. the chief shipping port, for the purposes of tea tasting and purchasing on favourable terms for their houses of trade. Next to the tea 'hong' the Camphor 'hong' plays the chief part in Twatutia, shewing the value of the export trade in these two products. To this place comes the camphor down from the mountains; partly by water on the Tawsui river; partly by a road built a few years ago by English Engineers for the Chinese Government; and partly on the broad shoulders of sturdy Chinese called 'coolies.'

In order to reach the place of production of the Camphor, one has first to travel by road for many miles into the interior, then partly on foot by narrow foot paths, partly in sedan chairs borne by coolies in country fashion up to the higher and steeper mountain passes, where the cultivation of the soil has to be fought out with greater difficulties and where the aborigines of the island, who belong to the Malay race, have withstood till now under the shade of the primeval forest the further advance of the Mongolians.

The Camphor Tree (*Camphora officinalis* or *Laurus Camphora*). Here in the luxuriant verdure of the countless varieties of the vegetation of a tropical and subtropical forest, we can recognize


T
a.
b.
Fig. 3.
S
W
F
Fig. 1.
Fig. 2

among the many varieties of ferns, among the palms and tall bamboos, among the different kinds of fir and the thousand other known and unknown representatives of the flora of the country, the giants to whom those lines are devoted,—the Camphor trees. The tree belongs to the family of the Lauraceæ and its home is on the Eastern monsoon region where it is found from the 9th to the 30th degree of north latitude, on the East coat of Asia and its neighbouring islands. It reaches enormous dimensions and is considered in Japan as the king of broad leaved trees. Thus Professor Bälz of Tokio records a camphor tree having 72½ ft. in circumference at breast height and being 2,000 years old. Rein, too, gives in his excellent work on Japan, the astonishing dimensions of this tree as reaching 11½ metres in circumference and 50 metres in height.

The Camphor tree resembles our oak in its whole habit. It has the same mighty stem, with often a rough bole, the knotty branches and the irregular crown which besides in consequence of the thick foliage with dark green leathery leaves is almost impossible to see through. The interior of Formosa is still to be considered as among the richest in proportion to other lands. But in the continually growing trade in Camphor, and the wasteful kind and method of its exploitation, the stock accumulated in many centuries will soon be exhausted if nature does not in her tropical exuberance of vegetation produce sufficient regrowth, or the Chinese following the good example of the Japanese begin to start a proper system of forestry.

The exploitation of the Camphor. Here in the centre of the island, the camphor trees are felled in the management of the primeval forest, when they have 3 to 4 feet in diameter. The upper part of the bole, which gives but little camphor, generally remains lying worthless if it falls in a place which is not favourable for being taken to market, partly for consumption on the island itself, partly for export. The rootstock, however, and especially the the roots which contain much camphor are cut with specially formed axes (fig. 1) into pieces about two centimetres long, called 'chips' (fig. 2). These are then placed in one of the nearest camphor stills which are erected in the forest itself and set up in various places in the island, (fig. 3) with hot water boilers through which the camphor is extracted from the wood and precipitated in converted earthen pots fig. 3a). In Japan, the camphor stills work more cleanly and the steam is led sideways through a hollow bamboo into a condensing apparatus, over which water is led constantly in order to cool it and which at the same time affords a good means of confinement against the escape of steam. But in Formosa also, stills are worked for which the Chinese Government demands monthly a licence tax of one Mexican dollar (*3s*) and these make a better distilling apparatus and economize material.

After the camphor has been precipitated on the walls of the pot it is scraped off and brought in leaf baskets to the 'hong' of the camphor merchant. In this conditon it still contains much oil of camphor and thus it comes into export, and possibly in order to economize weight and volume, means has lately been sought for separating the oil from the camphor in presses brought from Europe After this procedure has been gone through in the 'hong,' the camphor is usually packed in lead-lined chests and goes on its journey to different quarters. This raw camphor is sublimed again in Europe and America, and comes out, then in the form of shell shaped colourless transparent pieces of a granular crytalline structure suitable for the retail trade.

What is Camphor used for ? The best known use of camphor is still, as already explained, that of the protection of furs. For this reason also, in Eastern Asia, where furs are much worn, chests made of camphor tree wood are much in request. It is also much used in medicine for many purposes, and the fabrication of camphor oil, camphor spirits and camphor wine, absorbs a noteable percentage of the quantity imported. In industries, it serves for the preparation of blasting gelatine and celluloid which latter nowadays is employed so much for making billiard balls, stick tops, combs, knife handles, &c., and for the imitation of ebony and malachite, as well as for the various kinds of smokeless powder.

Export of Camphor from Japan and China.—The following statistics, shew the great importance of the camphor trade in Japan and China (Formosa), of late years. They are chiefly obtained from the 'Résumé Statistique de l'Empire du Japon, and the 'Statistical series of the imperial maritime customs in China.'

Export of unrefined Camphor from Japan.

1886,	32,696	cwt.	valued at	£	193,957
1887,	38,874	„	„	„	236,294
1888,	27,338	„	„	„	212,738
1889,	29,825	„	„	„	290,796
1890,	26,782	„	„	„	403,786

Export of raw Camphor from Formosa.

1889,	2,521	„	„	„	„	11,897
1890,	4,389	„	„	„	„	34,939
1891,	11,192	„	„	„	„	89,499
1892,	10,486	„	„	„	„	83,395

Import of Camphor into Germany.

1886,	cwt.	3,989
1887,	„	6,468
1888,	„	7,943
1889,	„	7,070
1890,	„	7,298
1891,	„	11,444

while the value of 100 kilogrammes (2·4 cwt) was £14 in 1890 and £15 in 1891. So that of late years the value alone of the raw camphor imported from Germany reached £156,660, a sum which to take a forest comparison, surpasses half the revenue of the Wurtemberg state forests.

(*Translated from an Article in the 'Forstlich Naturwissenschaftliche Leitschrift' for August 1893, by B. R. Freiherr von Herman*).

II—CORRESPONDENCE.

Tea-box Woods

SIR,

Referring to Mr. Thurston's note on Indian Woods for tea-boxes, published in an appendix to the 'Indian Forester' of November 1892, and to a letter on the same subject written by Mr. Hope, which appeared in your issue of last, I should like to put forward the following remarks upon the subject in question :—

My experience has been gathered wholly from the Darjeeling Tea District, and though writing this letter from the Chittagong Hill Tracts, I am certain that the views put forward by me will have the concurrence of some, at least, of the leading planters of that district.

Mr. Hope in his letter assumes that Semul wood (*Bombax Malabaricum*,) is more or less a kind well suited for tea-box purposes ; as far as the Darjeeling district is concerned, that is certainly not the case, for the Semul wood is looked upon as one of the worst possible to be so utilized, unless the planks have been cut from very old and large trees ; it having the reputation of getting worm eaten before its arrival at the European markets ; and I have been told that brokers in Calcutta would give a higher rate for teas packed in Toon (*Cedrela Toona*,) boxes than they would for those packed in Semul.

I will not attempt to answer Mr. Hope's question, as most of them refer to the Dehra Dun district ; but the following will help to explain the reason why the so called 'Japan boxes' or 'Shooks' are preferred to those made from Indian timber.—

When a manager wishes to cut his tea boxes from forest trees, he arranges, as a rule, to have it done by contract, which is generally given to one of his sirdars This sirdar to execute his contract, has to call on outside coolies to help him : now to procure these he has to make heavy advances, which the manager has to give to the sirdar from the Tea-concern.

It may happen that the outside cutters and sawyers get ill, or discontented, and run away with these same advances thus creating a loss to the concern, for they are too cunning to allow themselves to be caught and prosecuted. Even if such be not the case, one cannot depend upon the sirdars to finish the contract within the limited time ; then imagine the anxiety of the manager for he would be in a 'fix' (to use an Americanism), if his box planking were not in before the rains broke.

Further, when the planking is cut up, it usually takes the shape of 10 in. by 1 in. planks; these are stacked in the factory, and so as not to have too much room occupied by empty boxes, these planks are cut up and fashioned as they are wanted. Now compare the difference in the room wanted by the carpenters when cutting up and putting together boxes made from such planks, and that required to put together boxes whose tops, bottoms, and sides, have already been fashioned.

No wonder then that planters are willing to pay an anna or two extra for the 'shooks'! for he only has to give an order, and his responsibility and risk is reduced to a minimum

Now my opinion is ; that the forest Department should arrange to have planks cut into shapes suitable for tea-box-making · that these shapes should be procurable from any central depôt.

It would be useless to try any experiment of this kind without the assistance and co-operation of the planters concerned; to procure this, the various Tea Associations should be addressed asking them for their co-operation, and at the same time request, ing them to name any local trees that may be fit and suitable for box planking and which they would be prepared to try, a this Department could manage to cut and shape the wood at if fairly cheap and profitable rate.

W. H. L.

Legal duty of Assistance and Information.

DEAR SIR,

I do not know whether remarks on a legal question appearing in your September number, and sent out from England so as to reach you (I suppose) in November, will be of much use ; but in case it may be, I will proceed to note that Sec. 78 of the Indian Forest

Acts, unquestionably is a *law* in every sense of the term, and it imposes on the particular class of persons therein enumerated the *legal duty* of giving information as to (fulfilled) commission of any forest offence, or the intention to commit one. Forest Offence is defined to mean an offence punishable under the Act or Rules made pursuant to it.

There is no special penalty attached to Sec. 78, because, when a person becomes *legally bound* (*by any law*) and neglects the obligation, he becomes liable to the provisions of the Indian Penal Code. This Act provides several sections on the subject, *viz.* 176 and 177,202 and 203, and 187. These are general in terms and occur in chapters dealing with offences against the authority of (all classes of) "Public Servants" (vide definition Sec. 21,) and against Evidence and Public Justice. It passes my comprehension to understand how any Court or other person could doubt that a person infringing Sec. 78 of the F. Act. (when clearly brought home to him ;—this may be difficult to prove but it is a question of fact, that he was called on to assist and refused, or that he possesed the information and did not give it) is liable under one or other of the above sections, I. P. C. It is because he is obviously so liable, that no penalty was added in the Forest Act.

It will be observed that Section 187 (the only one quoted by your correspondent) applies in case it is a matter of omission to *assist*, under the 1st portion of the Section if it refers to general assistance, where demandable by law ; under the 2nd portion, if the assistance was to *prevent* an offence (*i. e.* any offence whatever by definition, Sec. 40, ch. 2).

If it is an omission to *inform*, then the 1st part of Sec. 176 clearly applies in *all* cases ; and the second part in some. The *duty* as defined in the Forest Act is to report *all forest offences*; and that of course comes within the obligation to furnish '*any* information' the breach of which Sec. 176 (1st part) punishes. If it was intended to apply the 2nd part and its larger penalty, it must further be shown that the information omitted related not only to a forest offence but to one of the graver kind which carries a penalty of not less than six months prison (with or without force), for the further condition is required by the terms of Sec. 176 (part 2nd,) the 'offence' there alluded to being (by definition Sec. 40 clause 2,) one of the grave ones described. Practically, the Forest Officer would not want to complain of neglect to inform about the intention to commit a forest offence unless it was of a serious kind ; if (under special circumstances) he did, he would have to proceed under the 1st part of Sec. 176; because that includes *any* legally required information on any subject.

I may remark that Sec. 276 is followed by 177 the first relating to *omitting* information, the second to giving *false* information.

It is also worth while to add, that the Code has given another pair of Sections 202, 203, (distinguished by the same feature) ; and the reader will at first be inclined to suppose, that Secs. 202 and 203 are mere repetitions of Secs. 176 and 177, the difference is not very great, but the pair 176 and 177 refer to *intention* to commit, and the other to offences actually *committed*. They might have been clubbed together but then Sec. 176 *also* includes *any* information (not necessarily connected with offences—such as news that a forest is on fire by accident,) and so it was thought that it would conduce to clearness to have a separation.

An offence against Secs. 187 and 176, or 202 I. P. C. could not be compounded under Sec. 67 of the Forest Act ; an offence solely punishable under the General Law (I. P. C.,) is not within its meaning. As these sort of matters are always easier to understand and to remember by aid of a sort analytical diagram, let me conclude by giving you one.

(A) Omission to ASSIST (when bound by law *e.g.* sec. 78, I. F. A. or other law)	(*a*) *any* assistance demandable by law	I. P. C. sec. 187 1st portion.
	(*b*) special assistance to prevent an offence, which means (by definition) *any* offence whatever.	187 2nd portion.
(B) Omission to INFORM. Do. Do.	(1) regarding *any* subject required by law—may be about offences or otherwise.	176 (1st portion.)
	(2) regarding an offence *intended* (*i.e.*) an offence under I. P. Code or under special law if of the graver class (this by definition.)	176 2nd portion.
	(3) regarding an offence actually *committed* (*i.e.* offence as in (2).	202

[In either case if instead of *omission*, it is giving *false* information, the Secs. become 177 and 203 respectively ; and in the case of 203 (only) the meaning of 'offence, is enlarged to include any offence whatever.]

B. H. B. P.

A Tour in Jaunsar.

DEAR MR. EDITOR,

I wish to offer a few remarks on the notes which appear under this title in the July and August numbers of the Indian Forester.

In treating of deodar plantations the writer fails to notice the very important question of the age of the transplants used. I hope he will supply this omission some time, for the generally unsatisfactory results obtained in the various attempts made in Jaunsar to propagate deodar by planting, have been due in my opinion, to the transplants having been put out too young. In my working-plan for the Mundali forests (I speak from memory), I have shown how much greater success was obtained with deodar planting in the Ranikhet and Naini Tal Forests, simply because large transplants were used. The deodar seedling, even when put out at the age of 5-6 years, displays great vitality and recovers easily and rapidly from the mutilation of its roots inevitable in all transplanting operations.

But we need not go outside of Jaunsar to prove the advantage that large deodar transplants have over small ones. Indeed we need not go further than the plantation in the Lurli Block just below the hospital, which is described in the notes. An examination of this plantation will show now much larger and more vigorous the seedlings are which were put out in filling up vacancies, but which are nevertheless of the same age as those surviving from those originally planted out. I pointed out this to the Divisional Officer when I conducted the Forest School tour in 1890.

He seemed convinced, and at any rate, if I remember correctly, expressed his intention, in a Report which I have recently read, of in future using only transplants of a certain age. I consequently felt no little surprise at reading on page 242 of the *Indian Forester* that plants only two years old are considered as "ready to be put out into the forest."

When one compares in Jaunsar the size and vigour of the seedlings left standing in the nurseries with those of their companions put out into the forest, one cannot but be struck with the difference. Such should not, however, be the case, seeing the marvellous recuperative powers of deodar transplants, and it becomes at once clear that, as a general rule in Jaunsar, the transplants have been used far too young.

I shall be glad to be proved in the wrong, but the conclusion I have come to is based on close observation and special attention given to the subject during a period of ten years.

To settle the question once for all to the satisfaction of all parties, the School Circle Officers should establish a series of experiments, employing transplants of various ages under, in other respects, similar or identical conditions. The results of such experiments will not of course begin to show themselves

for the next ten years at least; but in the meantime our colleagues in the Punjab and in the Central Circle of the North-Western Provinces will no doubt give us, in the pages of the Journal, the benefit of their experience in connection with deodar planting in their respective charges, and the Forest School has unrivalled opportunities of studying the question in the numerous small plantations in Jaunsar.

What I have said in respect of the deodar is true also in respect of *Pinus longifolia*, and will in all probability be found to hold true in the case of the blue pine as well. The difference of results, in *Pinus longifolia* plantations, when small seedlings are used and when large ones, from 18 to 30 inches high, are employed is strikingly in favour of the latter, not only as regards the percentage of success, but also on the score of vigour and rapidity of growth. And as for the blue pine all attempts made to propagate it in Jaunsar have been admitted failures, the reason, in my opinion, being that such attempts have been limited either to direct sowings or to planting out small seedlings, which in the very nature of things possess too little vitality to survive in any appreciable numbers.

Another point in the paper I would notice is the incredible statement contained in the following sentence regarding the reason for the appearance of self-sown blue pine seedlings on slopes on which no parent trees are known to exist:—"It is possible that the seed may have been blown across the valley from the heights of Matkangra, a distance of two or three miles in a straight line"! The note of interjection is mine. It is curious how this impossible wind theory suddenly found admittance into printed reports above the signature of a very high placed officer about a score of years ago and has enjoyed currency ever since. A tornado would be mere child's play to the wind that could blow blue pine seeds, winged though they are, three miles across a valley several thousands of feet deep. The agency of birds is quite sufficient to account for the appearance of the seedlings in question. I have seen the Jungle crow (*Corvus macrorhynchus*) in flocks of over thirty birds picking out seeds from spruce fir cones, and on being disturbed, making off with the cones in their bills and flying across to the opposite hill side. One one occasion I happened to be breakfasting off cold chicken on a spur overlooking a broad valley. A crow of this species watched me eating, and as he picked up each bone he flew off with it to the opposite hill-side nearly a mile off where he finished it. He returned for his next bone in less than six minutes. I quote the above instances to show how this peculiar habit of a single species of bird is sufficient to explain the occurrence of young blue pines on slopes bearing no parent trees on the heights above. But besides the crow, we have the various pheasants and the Himalayan nutcracker (*Nucifraga hemispila*), and no doubt other birds also, to account for the phenomenon.

E. E. FERNANDEZ.

III.—OFFICIAL PAPERS & INTELLIGENCE.

The new draft Rules regarding Settlement and the positions of Revenue and Forest Officers.

The following Draft rules regarding the settlement and management of land taken up under the India Forest Act, and regulating the position of Revenue and Forest Officers in regard to the administration of such land, have been circulated by the Government of India for opinion and as they contain much of considerable importance to Forest Officers, we consider it right to reproduce them in our pages.

PART A.—PREAMBLE.

1. It is important that all lands in which Government hold or claim a complete or material proprietary interest, which have not been formally demarcated and settled, and which are considered suitable for timber forest, fuel and fodder plantations, grazing reserves and the like, should be demarcated, and the rights therein definitely settled with as little delay as possible.

2. The settlement of such lands need not be immediately followed by the constitution of timber forest, plantations or grazing reserves. They can, until required for these objects, be utilized for any purpose. What is required is that they should be recorded and settled as Government property, available for any of the objects above described.

3. Although it is not contemplated by the Forest Act that lands primarily destined for agricultural purposes should be brought under the provisions of that Act, there is nothing to prevent lands settled under the Act being utilized for agriculture, whether they remain under the provisions of the Act or are disforested.

4. In the Act there is no definition of 'forest.' As in Scotland, the term may be applied to land absolutely destitute of trees. Accordingly lands taken up under Chapter* II of the Indian Forest Act, VII of 1878, and technically constituted "reserved forest," are not required under that or any other law to be planted with trees, or to be maintained for the growth trees.

* Chapter II of the Burma Forest Act, 1881.
Chapter II of the Upper Burma Forest Regulation, 1887.
Chapter II of the Madras Forest Act, 1882.
Chapter II of the Assam Forest Regulation, 1891.
Chapter II of the Berar Forest Law, 1886.
Chapter II of the British Baluchistan Forest Regula tion, 1890.
Section 3 *et seq.* of the Ajmere Forest Regulation, 1874.

5. As lands taken up under the Forest Act may be utilized for cultivation, grazing, or any other purpose, so they may be placed under any management, whether (as in the case of cultivated forest

land or grazing areas in some provinces) that of Revenue officers, or (as in the case of certain horse-runs, grass-farms, &c.) that of the Military Department, or (as in the case of forests proper, or of areas in which grazing or fuel and fodder reserves require special management and protection) that of the Forest Department.

PART B.—GENERAL RULES.

I.—All waste land considered suitable for timber forest, fuel and fodder plantations, grazing reserves and the like (1) which is the property of Government, or (2) over which the Government has proprietary rights and wherein the rights of the Government and of persons other than the Government have not been precisely determined and recorded, shall be taken up, dealt with, and settled under the provisions of Chapter II of the Indian Forest Act.

II.—Lands so settled will be classed under one or more of the following heads :—

(i) Agricultural lands.
(ii) Forests proper.
(iii) Fuel and fodder reserves.
(iv) Pasture lands.
(v) Any combination of (ii), (iii), and (iv).
(vi) Special purposes (*e.g.*, horse-runs).

III.—The Collector shall after consulting the District Forest Officer and the Conservator of Forests, submit for the orders of the Local Government, through the usual channel, proposals indicating for which of the purposes enumerated in Rule II it is intended to maintain the areas, when settled, whether in whole or in part.

IV.—The Local Government will when issuing orders on the proposals of the Collector, or as soon as possible thereafter, determine the agency under which each classified area shall be administered ; but it may from time to time change such agency.

V.—The Collector shall be responsible that all Government lands within his district are brought under settlement.

VI.—He shall submit annually to the Land Revenue authorities by whom he is controlled, for the orders of the Local Government, a schedule of unsettled lands with proposals for their settlement.

VII.—Lands brought under the Act and classed under Rule II (i) may, when required for agricultural purposes, either be retained under the operation of the Forest law or be disforested.

VIII.—If in the opinion of the Local Government they should be excluded, the previous sanction of the Governor General in Council must, under section* 26 of the Indian Forest Act, be obtained to their exclusion.

* Section 29 of the Burma Forest Act, 1881.
Section 27 of the Upper Burma Forest Regulation, 1887.
Section 24 of the Madras Forest Act, 1882.
Section 28 of the Assam Forest Regulation, 1891.
Section 11 of the Berar Forest Law, 1886.
Section 10 of the British Baluchistan Forest Regulation, 1890.

IX.—The Collector shall be responsible that the records of each settlement in his district are complete, and that they contain the following entries ;—

(*a*) A correct boundary register.

(*b*) Private rights admitted and settled under section 13 † *et seq.* of the Indian Forest Act, with such remarks regarding their limitation, commutation and extinction as the case may require

† Section 13 of the Burma Forest Act, 1881.
Section 11 of the Upper Burma Forest Regulation, 1887.
Section 11 of the Madras Forest Act, 1882.
Section 11 of the Assam Forest Regulation, 1891.
Section 10 of the Berar Forest Law. 1886.
Section 9 of the British Baluchistan Regulation, 1890.
Section 4 of the Ajmere Forest Regulation, 1874.

(*c*) Rights granted by the Local Government under section 22‡ of the Indian Forest Act, with the necessary particulars as regards duration, limitation, and other conditions.

‡ Section 22 of the Burma Forest Act, 1881.
Section 20 of the Upper Burma Forest Regulation, 1887.
Section 18 of the Madras Forest Act, 1882.
Section 21 of the Assam Forest Regulation, 1898.
Section 6 of the Berar Forest Law, 1886.
Section 5 of the British Baluchistan Forest Regulation, .890.

(*d*) Temporary concessions, changeable or terminable at the will of the Local Government, granted under rules made by Government under section 25* of the Indian Forest Act.

* Section 27 (*a*) of the Burma Forest Act, 1881.
Section 25 (*b*) of the Upper Burma Forest Regulation, 1887.
Section 21 of the Madras Forest Act, 1882.
Section 26 (*d*) of the Assam Forest Regulation 1891.
Section 10 (*a*) of the Berar Forest Law, 1886.
Section 9 (*a*) of the British Baluchistan Forest Regulation, 1890.

(*e*) Standing orders issued under section 25 of the Indian Forest Act for the permission of certain specific acts.

X.—The Divisional Forest Officer may at any stage of the operations submit to the Collector any proposal or suggestion relating to the classification of land or to settlements.

XI.—The Conservator may submit to the Local Government (through the proper channel) a report on the settlements in his circle or in any particular district.

XII.—In determining the agency under Rule IV, consideration should be given to the fact that the forest administration forms an integral part of the Revenue system of the country and that the forest staff provides the most convenient agency, under the control of the Revenue authorities, for the executive management not only of forests proper and of fodder and fuel reserves, but also of all Government lands in which these classes are intermixed with pasture lands, as well as, in many classes, of pasture lands which include no forests proper.

Circular Resolution No. $\frac{17}{105}$ (Agricultural), dated 15th July, 1891.

XIII.—Every settled area must be managed in accordance with a systematic and pre-considered working-plan, deviations from which should take place only under proper sanction.

XIV.—The scheme of management of each settled area should, so far as legal and political conditions permit, be based on all facts and influences upon which the most rational and profitable treatment depends. The collection, however, of the necessary data takes time, and all working-plans will therefore at present be divided into—

(a) *Regular working plans*—based on an efficient and methodical enquiry and consideration of all existing facts which may materially influence the manner of treatment.

(b) *Provisional working plans*—based on such data as may be available or can be collected without delay.

XV.—The regular working-plans must aim at a permanent treatment of the settled areas, and will be framed on a general scheme, which must, otherwise than in exceptional circumstances and for exceptional reasons, be permanently maintained: provided that detailed prescriptions for the intermediate treatment, necessary to bring the land into the ultimate and permanent condition aimed at, may be made for such limited terms of years as may be considered necessary.

Provisional working-plans (which may extend for one or more years) are only intended to be used as 'make-shifts' until sufficient data have been collected for the preparation of regular working-plans.

XVI.—The Collector will, with reference to Rule II. be responsible for the preparation of working-plans in the case both of lands of class (i) and of those lands in classes (ii), (iii), (iv), and (v) which are not under the executive management of the Forest Department. In the case of lands of class (vi), the appropriate special Department is responsible.

PART C.—SPECIAL RULES RELATING TO LANDS UNDER THE EXECUTIVE MANAGEMENT OF THE FOREST DEPARTMENT.

Preparation of Working-plans.

XVII.—The following rules are prescribed for the preparation of Working-Plans :—

(a) The Divisional Forest Officer shall submit to the Collector, not later than six months before the beginning of the forest year, a report containing a list of all areas under his control. He shall in his report—

(1) *as regards those areas for which regular working-plans are in operation*, shortly state what works will be carried out under the prescriptions of such plans in the year following ;

(2) *as regards areas managed according to provisional working-plans*, mention what works are provided for the ensuing year ;

(3) *for areas for which no regular or provisional working-plans are provided for the ensuing year* make proposals, after due consideration of the possibility and the requirements of each area, for provisional working-plans, which shall contain his recommendations as regards fire-protection, closure against or regulation of grazing, and works of sylviculture, forest improvement and the like, and the term for which (*i.e.*, whether for one or more years) it shall be in operation.

(*b*) The Divisional Forest Officer should, either when he forwards the report required by clause (*a*) of this Rule, or at any other convenient opportunity, submit from time to time, *in respect to any areas for which no regular working-plans exist*, provisional proposals for the preparation of regular working-plans, stating whether he is in a position to compile the plans himself and noting the assistance he may require for this purpose, or recommending that the work should be undertaken by special agency.

(*c*) The Collector shall, on receipt of the report prescribed under clause (*a*) above, forward without delay to the Conservator of Forests sections (1) and (2) thereof, indicating the works to be undertaken during the following year under the provisions of existing working-plans. The Collector may retain section (3) for consideration of the provisional working-plan with special reference to the satisfaction of rightholders in regard to forest-produce; to any proposed closure against grazing; to the withdrawal of privileges which Government may have conceded; or to local wants in forest-produce generally. And he may, if he considers such plan open to objection in any of these particulars, return the same with his comments to the officer from whom it was received, for alteration in accordance with any directions he may make. In the event of such directions being considered by the Divisional Forest Officer to be beyond the 'possibility' of the forest in question, *i.e.*, to be incompatible with its maintenance and improvement, the case will be referred to the Conservator through the Collector If the Conservator and the Collector, after such consultation as may be necessary, are unable to agree as to the treatment of the forest, the case will be referred to higher authority, and if necessary to Government.

(*d*) Provisional plans approved by the Collector shall be forwarded, within one month of their receipt, to the Conservator, who may, if he concurs, sanction them. In cases where the Collector and the Conservator

differ in regard to the applicability of any provision in a provisional working-plan, and when the difference cannot be removed by mutual references, the question shall be submitted to the higher Revenue authority, who shall endeavour to settle it with the Conservator, and, if unable to do so, lay it before Government for orders, informing the Conservator that he has done so.

(*e*) The Collector, on receiving provisional proposals for the preparation of working-plans under clause (*b*) of this rule, shall submit them with his comments to the higher Revenue authority, who will forward them to the Conservator for further action.

(*f*) Except as provided in Rule XVI, the Conservator is responsible that regular working-plans are prepared as soon as possible for all reserved forests in his Circle. He may either take the initiative in drawing up the plans, or may take action on the provisional proposals submitted by the divisional officers as above. In either case he will be responsible for the soundness, on all technical points, of the provisions of the working-plans, and for the manner in which they are framed.

(*g*) Every working-plan shall, after it has been framed or scrutinized by the Conservator, be finally examined by the Collector with special reference to the satisfaction of right-holders in regard to forest produce; to any proposed closure against grazing; to the withdrawal of privileges which Government may have conceded; and to the requirements of the adjacent population generally. It shall then be submitted, through the superior Revenue authority, to the Local Government for sanction. In cases where the Collector and the Conservator differ in regard to the practicability of any provision in a working-plan, and where consultation or mutual references fail to settle the question, the views of both officers shall be submitted to Government with the opinion of the superior Revenue authority.

(*h*) In the Bengal Presidency, all regular working-plans are submitted to the Local Government through the Inspector-General of Forests, who scrutinizes them and lays them before Government with his opinion.

Deviations from Working Plans.

XVIII.—For the regulation of unavoidable or desirable deviations from the prescriptions of working-plans, the following rules are prescribed :—

(*a*) The Divisional Forest Officer is responsible that proposals for any unavoidable or suggested deviations from sanctioned working-plans are, as soon as feasible, reported to the Collector, so that the necessary sanction thereto may without delay be given by him, or may be obtained from competent authority. Particulars of such sanction shall be entered in the Control books prescribed under the Forest Code.

(*b*) The Collector may sanction, on his own authority, any deviations from working-plans, regular or provisional, which do not involve either utilization* of forest produce in excess of prescription, or diminution in the extent of forest protected from fire, or of forest closed to grazing or browsing. Such deviations require the sanction of the Local Government. He shall report to the Conservator, for information and note, any sanction which he has given under this rule.

(*c*) The Collector shall forward any such proposals, which it is not within his own power to sanction, direct to the Conservator if the interests of the people are not materially affected, and through the superior Revenue authority to the Conservator if they are so affected.

(*d*) In cases where the Divisional Forest Officer has not, on his own motion, submitted proposals for necessary or desirable deviations, the Collector may, if he thinks fit, direct him to submit such proposals.

(*e*) The Conservator shall send direct to Government, for sanction, all proposals for deviations from *regular* working-plans received under clause (*c*) of this Rule in respect to which he agrees with the Revenue authorities. If he differs, he shall forward them through the Revenue authorities to the Local Government.

(*f*) The Conservator shall return, with his opinion, to the Collector all proposals for deviations from provisional working-plans received direct from the Collector under clause (*c*) of this rule. If he agrees with the Collector, the proposed deviation may be carried out. If he does not agree, the Collector will forward the case to the superior Revenue authority, who, if necessary, will submit it for the orders of Government.

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* Utilization of produce in any one year over and above the prescription for that year shall not be considered excess utilization if it is covered by unutilized balances from previous years.

(*g*) The Conservator shall forward to the Collector all proposals for deviations from provisional working-plans received through the superior Revenue authority under clause (*c*). If the Conservator agrees in the proposals, the deviation may be carried out. If he does not agree, the Collector will resubmit the case to the superior authority, who will, if necessary, submit it for the orders of Government.

(*h*) Particulars of all sanctioned deviations shall be entered in the Control books both of the Divisional Officer and of the Conservator.

Protection.

XIX.—To secure the protection of forests, the following rules are prescribed :—

(*a*) The Conservator of Forests is charged with the general control of the protection of the forests in his circle against damage by man or beast. He is required to suggest such measures as may be necessary to make protection efficient.

(*b*) The Collector, or other Revenue officer in independent charge of a sub-division, shall be responsible that the measures ordered for the protection of the forests in his district or sub-division are efficiently carried out, and that the subordinate Revenue and police officers of all grades render active assistance. He shall also control the working of the punitive sections of the forest law, and prevent any further interference with the people than is necessary for efficient protection.

(*c*) The Divisional Forest Officer, under the orders of the Collector, will be in charge of all works necessary to ensure the efficient protection of the forests.

(*d*) The Range-Officer is primarily responsible for the protection of the forests in his range, but is also bound to render general assistance in the protection of any forest.

(*e*) The Forest Officer in charge of one or more beats is primarily responsible for the protection of forests in his charge, but has also to render general assistance in the protection of any forest.

Technical management.

XX.—For the technical management of forests, the following rules are prescribed :—

(*a*) The Conservator of Forests shall control all practical 'working', including the disposal of forest-produce within the prescriptions of a working-plan. For this purpose he will examine the control forms. If he discovers by these means or during his tours of inspection, or from the Divisional Forest Officer's journal, any deviation for which sanction has not been obtained, he shall bring the matter to the notice of the Collector for necessary action.

(*b*) The Collector shall not, as a rule, interfere in the technical management of the State forests in his district, but shall nevertheless exercise a general supervision, and may address the Conservator on any matters regarding, and suggest any change in, the technical management.

(*c*) The Divisional Forest Officer is responsible that all works of sylviculture, forest improvement, exploitation, &c., prescribed by regular working-plans or annual plans-of-operations, are carried out completely and in a workmanlike manner; that all orders regarding fire-protection, closure against grazing, &c., are effected in the manner and to the extent laid down in the working plans and plans-of-operations; that the necessary entries to this effect are made in the Control books; and that any special works, not specified in the plan-of-operations, which he may have been ordered by competent authority to carry out, are carefully executed.

(*d*) The Range-Officer is in direct executive charge of all works of sylviculture, improvement, exploitation, and of special works which he may at any time be directed to carry out, or which may be in progress in his range, either under the prescriptions of working-plans, or under the special orders of the Divisional Forest Officer.

(*e*) The Beat-Officer is charged with the supervision of works of sylviculture, improvement and exploitation, as well as of any special works which he may have been ordered by the Range-Officer to carry out.

Finance.

XXI.—The Conservator shall be the controlling authority in all matters of finance; and, subject to the rules contained in the Departmental Code, he may address the Local Government direct on such matters.

Organization and discipline of establishments.

XXII.—As regards organization and discipline of establishments, the following rules are prescribed:—

(*a*) The Conservator shall be the controlling authority, subject to the orders of the Local Government, in all matters regarding appointment, promotion, reduction and dismissal in the subordinate branches of the Forest Service in his circle, and in matters of departmental discipline, and may address the Local Government direct on all such matters.

(*b*) The Divisional Forest Officer in charge of a forest division is *ex officio* the Assistant to the Collector, or, as the case may be, to the Assistant Collector in charge of an independent revenue sub-division.

XXIII.—The Divisional Forest Officer has, subject to the provisions of the Forest Department Code, entire control of the executive and subordinate forest staff in his division.

The officer in charge of a range is, as a rule, directly subordinate to the Divisional Forest Officer; but the Local Government may direct that he shall in the first instance be subordinate to an intermediate officer.

In the same way, the officer in charge of a beat is ordinarily directly subordinate to the Range-Officer; but, in cases where the range is exceptionally extensive, the Beat-Officer may, under the orders of the Conservator, be subordinate in the first instance to an intermediate officer.

Routine and Office work.

XXIV.—The Conservator of Forests shall correspond direct with the Divisional Officer and issue orders to him on the following subjects:—

(*a*) All matters directly relating to accounts and to expenditure and revenue in the forest division.

(*b*) All matters of a purely technical nature, such as development of trees; sowing and planting; elaboration of the system of fire-protection; valuation surveys; the collection of technical data required in the preparation of working-plans; the manner of executing thinnings or improvement cuttings; felling; converting, transport and storing of timber and firewood; the disposal of material available under working-plans; plans-of-operations.

(*c*) Such miscellaneous subjects as the purchase of departmental cattle, stores, tools and plant, books, maps, &c.

(*d*) Matters of discipline.

XXV.—All correspondence with the Divisional Forest Officer on other subjects shall pass through the Collector, from or through whom orders shall emanate.

XXVI.—The Collector shall, in respect of such correspondence, ordinarily forward it under flying docket after perusal. But he may, whenever he deems it necessary, record his remarks on any communication addressed to the Conservator by the Divisional Forest Officer; and he may return, for reconsideration, any instructions addressed by the Conservator to the Divisional Forest Officer, recording the grounds on which he asks for reconsideration.

XXVII.—Should any instructions from the Conservator to the Divisional Forest Officer be returned by the Collector, and should the Conservator, on reconsideration, not deem it right to modify his orders, the Conservator will submit the case to the superior Revenue authority, who will, if necessary, forward it for the orders of Government.

The Conservator shall be kept regularly informed of all orders issued on forest matters by the Collector and the superior Revenue authority, and shall be consulted by them

previous to the submission of important questions for the orders of Government.

XXVIII.—All orders to the executive and subordinate staff in a forest divison must emanate from the Divisional Forest Officer, or at least pass through, and be issued by, him.

XXIX.—The Divisional Forest Officer may, under the authority of the Collector, address letters and orders to subordinate Revenue and Police officers in matters in connection with which the Collector considers it convenient that the Forest Officer shall act without his intervention.

XXX.—All orders shall ordinarily reach the Range-Officer, from or through the Divisional Forest Officer. Should a superior officer give verbal instructions or orders to a Range-Officer and the Divisional Forest Officer not be present, the substance of the orders shall be communicated to the latter officer in writing. The Range-Officer shall make his reports and submit his accounts to the Divisional Forest Officer.

XXXI.—Similarly, all orders shall ordinarily reach the Beat-Officer through the Range-Officer. Should a superior officer give verbal instructions or orders to a Beat-Officer, and should the Range-Officer be absent, the substance of the orders shall be communicated to the Range-Officer in writing. The Beat-Officer shall make his reports and submit his accounts to the Range-Officer.

Diaries.

XXXII.—The Range-Officer shall, on such dates and for such periods (which under no circumstances should exceed half a month), as may be prescribed by the Divisional Forest Officer, draw up in his own hand a sufficiently full report or diary of all his movements and of all business of material interest or importance transacted by him during such period, and shall submit it to the Divisional Forest Officer.

XXXIII.—The Divisional Forest Officer shall, on the 1st and 16th of each month, draw up in his own hand a short but sufficiently full report or diary of all his movements, and of all business of material importance transacted by him during the preceding half-month This diary shall include the substance of the more important facts recorded in the most recent diaries received from the Range-Officers, and shall be submitted to the Collector.

XXXIV.—The Collector shall forward, without delay to the Conservator, the Divisional Forest Officer's

fortnightly journal, making such remarks thereon as he may think fit.

Inspections and inspection notes.

XXXV.—The Conservator may, from time to time, after inspecting the forests of any district in his circle, forward an inspection-note to the Collector, adverting more particularly to the following questions:—

Surveys and Settlements, made or in progress in his district; their cost; extent to which still required; nature and adequacy of maps and settlement records prepared; results of working under the settlements in force.

Working-Plans, already made or in progress; their cost; extent to which still required; results of working-plans in force.

Demarcation, nature and state of repair of boundary-marks; demarcation work in progress, its cost; work still to be done.

Roads, buildings, and other similar works, in existence or under construction; their cost; state of repair; new roads, buildings, or other works required.

Executive and protective staff, efficiency, state of discipline, &c.

Condition of the forests, methods of treatment employed; natural reproduction, causes which interfere with it, &c.

Protection of the forests from injury by man, by cattle, by fires, &c.; breaches of forest rules, their frequency and causes.

Works of reproduction and cultural improvements, extent, condition, and cost of plantations, made; condition of nurseries; new sowings or plantings required; thinnings, creepercutting, &c., extent to which carried on and required.

Methods of working and management in force, advantages or otherwise of methods; expenditure incurred; outturn of forests; financial results.

Timber depôt, situation and adequacy; condition in which maintained; state of records, &c.

A copy of every such note should be submitted to the Local Government by the Conservator.

Transfer to Conservator of Collector's powers and duties.

XXXVI.—In compact forest areas, by the management of which the surrounding population is not appreciably affected, the Local Government may transfer to the Conservator by a general order any or all powers and duties of the Collector under these rules.

IV.—REVIEWS.

The beginnings of the Royal Botanic Gardens at Calcutta.

We have received a copy of a pamphlet recently issued from the Bengal Secretariat Press with a short account of Colonel Kyd the founder of these gardens.

Col Kyd was born in 1746 and died in Calcutta in 1793, being then Military Secretary to Government, and a Royal Engineer. It was in 1786 that he submitted to the Governor-General his plans for making a Botanic Garden as the account says :—

"Colonel Kyd conceived the idea of supplying the Company's 'Navy with teak timber grown near the ports where it could be 'used in ship building, and of increasing their commercial resources 'by introducing into India the cultivation of the species which in 'those days, formed so important an item in their trade, but for 'supplies of which they had to depend on their factories in 'Sumatra and Penang. He communicated this idea to the 'Governor-General of the day ; and, in a letter written on 1st 'June 1786, he officially submitted a scheme for the establishment 'of a Botanical Garden, or Garden of Acclimatization, near 'Calcutta. This scheme also included proposals for introducing, 'into territories subject to the Company, the cultivation of cotton, 'tobacco, coffee, tea, and various other commercial products."

His proposals were very favourably received both by the then Governor-General (Sir John Macpherson who was acting after the departure of Warren Hastings,) and by the Court of Directors and the garden was established.

For us the most interesting matter is the idea that Col. Kyd had of growing teak near the seaport towns, and a plantation was actually made on the land which was recently the 'Bishop's College' and is now the Sibpur Engineering College. On this the account says :—

"The part of the Botanic Garden nearest to Colonel Kyd's 'house was devoted to the planting of teak trees, in accordance with 'the Company's earnest desire to supply themselves with timber 'for ship-building. The experience of thirty-four years having 'shown that good teak timber cannot be successfully raised on 'the muddy soil of the Gangetic delta, this part of the garden 'extending to about 40 acres) was in the year 1820 given up by 'Government to the Lord Bishop of Calcutta (Dr. Middleton) 'as the site of a Christian College."

Of course, it is hardly surprising that the teak did not succed, although it grows by no means badly about Calcutta. Had it been mahogany, perhaps it would have remained and there might be now a valuable piece of forest. We have heard of similar experiments as regards teak having been tried near Rangoon, but also unsuccessfully.

Report on Canal Plantations, N.-W. P. for the year ending 31st March, 1892.

The Report for 1891-92 was reviewed in our number for April 1893. The present Report consists of a mass of statistical tables which are somewhat bewildering. However, we see that the financial results were very good as the *net* revenue was Rs. 1,53,824 a very considerable increase on that of the previous year More than half of this amount comes from the Upper Ganges Canal.

The area of the plantations is ac. 37,052 so that the net revenue per acre is Rs 1,462. The number of 1st class trees, that is trees of six feet girth and over is 44,890.

The Report says nothing as to what is the system of working and whether a permanent annual yield is arranged for—the points which a Forest Officer would most like to hear about. Nor is any information given on the subject of the progress of the Eucalyptus plantation to which we referred last year. That things are not all going quite rightly as regards reproduction is clear from the statement that 're-stocking is not keeping pace with the felling' on the Lower Ganges and Agra Canal. But there can be no doubt that the plantations constitute a valuable property and one which, under a system of Working Plans of a simple character ought to improve and even more than at present meet the requirements of the neighbouring villages.

V.—SHIKAR AND TRAVEL.

A Man-eater.

SIR,

As all authentic accounts about the ways of man-eaters are interesting, I asked the writer of the following letter to give me details of his recent experience, for publication in the *Indian Forester*. As it is well to fix the responsibility of all such stories, I hope my friend will permit me to give his name (Mr. P. B. Thomas of the Madras Police,) and I sign this introductory note.

VIZAGAPATAM, *10th October, 1893.* } P. W. PEET.

For over three years a man-eating tiger had been ranging through an out-of-the way corner of the Northern Circars, and for over three years no one could get a chance at the cunning brute. The country was a "big" one, well watered even in the hottest weather by several rivers that never dried up and consisting for the most part of jungle clad hills lying at an elevation of from two to four thousand feet. The country swarmed with game, principally bison, and the few villages in it lay at long distances apart, each buried in its own remote valley, and containing at the most some ten or fifteen huts.

The man-eater used to range over about 25 or 30 square miles of the country and though he shewed great audacity in his kills, frequently taking a man or woman in broad daylight in full view of the village, yet he never killed within 15 or 20 miles of his last kill, and seldom at shorter intervals than a fortnight or three weeks. He was said to be particularly partial to bison, and many a time had I felt very "creepy" when tracking them through the jungle he used to frequent; though the natives always said of this tiger that he never attacked a party of 3 or 4 men together and seldom killed anyone in the jungles; preferring to pounce on single unprotected people on the outskirts of a village.

Under these circumstances it is easy to understand that any systematic shikarring of the beast was out of the question. The only thing was to wait till he "gave himself away" by a lucky chance, and that chance came about in this wise.

A friend "B" and myself were encamped near a small police station in August, and having a very good time of it amongst the bison; we had already brought a tigress to book at this camp but had only once heard of the man-eater, who had killed some 20 miles from camp. However the "khabar" was days old when it reached us so we could do nothing.

One morning I got back to camp about 12 o'clock, having been out since five after bison without finding any fresh tracks. B. was out in another direction About one o'clock some men came in with the news that the man-eater had killed a man six miles off at ten that morning. I started off as soon as possible with an elephant and some tins of soup, and got out to the place where the man had been killed about four o'clock. He was making a a clearing in the jungle in company with two other men and seemed to have just finished felling a tree when the brute carried him off in full view of the other two men. His axe and upper cloth were still lying where he had been standing.

Without a moment's delay I followed the broad track through the grass where the body had been dragged along, sitting on the elephant, and keeping a bright look-out. Some natives followed the elephant to assist in making a machan when we found the body.

This we did about half a mile off in some very thick dwarf bamboo jungle. The head was severed from the body and gnawed all over, and one leg had also been eaten. A machan was quickly constructed, and I got into it about five o'clock, sending the elephant and people away with orders to wait at the clearing where the man had been killed till they heard a shot. The elephant was then to come back for me.

It was a pouring wet night and there was no moon; so after watching till long after dark I fired a shot to call the elephant, and went back to a village some two miles off where I cooked a tin of soup and slept.

The next morning at dawn I started out again on the elephant but on getting to last nights machan we found that the body had been removed and an examination of the track showed that it had been dragged off only a very short time before we arrived; the shot I had fired in the evening probably prevented the tiger touching the kill till the early morning.

We found the body again a quarter of a mile further on. The trunk, one arm, and one leg still remained. There was a trampled space in the grass three yards in diameter, where the brute had evidently been rolling on the kill; but the body had been pulled under a small bush at a distance of 2 or 3 yards from this, evidently with the object of secreting it. It lay just above the bank of a deep nullah, with a small stream running along the bottom of it. The jungle was thin, but the grass very thick and nearly waist high. The nullah was fringed with bamboo.

We immediately made a comfortable machan in a tree some twenty yards from the trampled space alluded to and dragged the body into the middle of this space. This took about an hour, as I expected to have to wait all day and took care to make the machan big and shady, the day being hot. An old Police Head

Constable with me then produced three leaves of the "maddi" tree and seven leaves resembling those of an English lime tree in shape, only bigger and coarser. These leaves he placed under the body with great care telling me that it was quite hopeless to expect a shot unless this little arrangement was made.

He and I then got into the machan, telling the other men to go away with the elephant talking as they went. They did so, and all was silence. The Head Constable whispered to me that we had better take it in turns to watch, as the tiger was very unlikely to come till the evening.

We had been watching barely twenty minutes before I heard a rustle in the grass right in front of the machan, and in another second a magnificent tiger walked quickly out of the nullah, and stood for a moment on the bank. He was too much covered by jungle to give a certain shot so I sat motionless. He then turned sharp across me, and moved towards the trampled space where the body lay, exposing his shoulder fully. I raised my express quietly, but his eye caught the motion at once, and he looked quickly up towards us. I could only see half his head round the corner of a bamboo, and hesitated whether to shoot or not, but luckily he had not made me out and moved his head to get a better view, thereby exposing it completely. I immediately put in a bullet over the right eye, which rolled him over and as he lay kicking, another into the white of his belly. He still kicked, and I was not going to let him get up if I could help it, I put in four more shots; kept on at him in fact till he stopped kicking.

We then summoned the elephant and went up to him giving him a shot in the head to make all sure, as he was still breathing.

He was a fine tiger in perfect condition. Two of his fangs were broken, and were mere stumps, but he had nothing about him to account for his being a man-eater. He was very fat, and a heavy animal, 20 inches round the forearm but his length was only 9 ft. 5 in. However it was as much as we could do to pad him, even after he had been cleaned.

The record of kills attributed to this tiger from January 1891, to the date on which he was shot, was 45. He had on two occasions killed two women together, though he ate only one on each occasion. He had killed several people previously to 1891, but I do not know how many. I think that his singular want of wariness on the occasion on which he met his death was due to his never having been driven off a kill before. All that had ever been found of his previous victims were the bones. I do not think he had ever been shot at before, and there were no old bullet marks on him anywhere. He was probably one of a litter that had been brought up to man-eating.

P. B. T.

VI.—EXTRACTS, NOTES AND QUERIES.

The Adirondack Park.

There must have been some public interest in the woodlands of this state considerably more than half a century ago, or Governor DeWitt Clinton would not have sent a message to the Legislature in which he insisted upon the importance of sustaining the productive capacity of its forests. This sentiment had grown so strong by 1872 that a Commission with Horatio Seymour at its head, was appointed to enquire into the expediency of legislation for vesting in the State the title to the timbered Adirondack region and converting it into a public park. It would have been comparatively easy then to acquire these lands, but public opinion was not ripe for the project and as acre after acre of the forest has disappeared, the difficulties in the way of rescuing what remains have become greater and greater. The bill drawn up with care by the Commission of '85 was not adopted, and a substitute containing only a few of its features was enacted, but the destruction of the timber and the absorption of the land by various corporations and individuals has gone on as before. This imperfect scheme has now been superseded by another plan of administering the state forest-lands, embodied in a bill to which Governor Flower has just affixed his signature. How much this will accomplish in the way of saving the remnants of the North Woods depends largely on the intelligence and the executive force of the forest-commission just named. The measure is not such a one as has been recommended by those who have given the most study to the subject, but it may embody most of the protective provisions which it is possible to enforce until public opinion becomes more thoroughly educated. We have often expressed the opinion that a forest tract which is such an important factor in the welfare of the entire community as the North Woods should belong to the community, and that state ownership in fee-simple is, therefore, the only final and satisfactory solution of the problems involved.

The first part of the act just passed relates to all the forest-preserves throughout the State, but the important part of the law is that concerning the Adirondack Park, which sets apart certain townships in the countries of Hamilton, Franklin, Herkimer, St. Lawrence and Warren to be held in forest for the preservation of the chief rivers of the State and its future timber-supply and for the free use of the people for their health and pleasure. The State already owns a half-million acres within the boundaries of this park, and the novel feature of the bill is an effort to gain control of about as much more land for Park purposes, while leaving it to be owned as it now is by private individuals. The proposed convenient is, that in return for the remission of taxes on these lands by the State their owners shall contract to refrain forever from removing any of the timber thereon which is less than twelve inches in diameter at a height of three feet above the ground, except that the owners have the right of clearing for domestic purposes one acre in each one hundred of forest-land covered by the contract. The commissions also have the authority to issue leases of not more than five acres in one parcel for the erection of camps or cottages under conditions prescribed by them. They are also empowered to sell fallen timber and timber "injured by blight or fire," and standing timber which shall measure twelve inches or more in diameter three feet from the ground, the proceeds of which shall be credited to the fund for purchasing other land within Adirondack Park. They have the the power to sell the portions, of the 250,000 acres of forest-land owned by the state without the Park and to apply the money thus received to the purchase of land within the park, and they may exchange directly State lands without the park for lands within its boundary. Finally, they may buy lands within the park and leave the present owners the privilege of cutting down timber above the regulation size for fifteen years. This is an attempt at the gradual acquisition by the State of land which it is considered too expensive to take at once.

As we have said, the immediate value of this legislation depends on the quality of the commission just appointed. The power to lease tracts for camp-grounds and to make compacts for a divided ownership of the land may result in the establishment of many small parks which are practically private property, or in which the people have, at most, but few rights. The privilege to sell large timber is dangerous. If the proper method of cutting and transporting this is not strictly prescribed and enforced, great damage may be done to the smaller trees. No doubt, it is right for the State to sell its forest-products, for this is the only legitimate revenue which can be expected from the land. But this should only be done under the supervision of trained foresters, and with such men in charge there would be no need of fixing a limit to the size of the trees to be cut. A skilled forest-master knows what trees to cut, whether they are large or small, without any assistance

from Legislature. In many instances, for example, it would be advisable to thin out small trees of inferior kinds to aid the growth of better kinds. For the present, however the restriction as to the diameter of timber felled may be on the side of safety. It would be easy to criticise other details of the Act. But if a better law would fail of enforcement, owing to the lack of enlightened popular sentiment behind it, and if it is impossible to find men to whose charge the forest can safely be entrusted, the proper attitude now of all patriotic citizens is to encourage the commissioners in well-doing as they deserve it, to watch their conduct closely and point out mistakes of administration when they are made, and to continue through the press and otherwise to educate the people as to the vital importance of this forest to them and their children, until they are jealous of the slightest encroachment upon their right to have it preserved and perpetuated.—(*Garden and Forest.*

World's Fair Notes.

The following Extract from the Chicago 'Evening Journal' was sent to one of our correspondents by W. H. Norman Tod of the Forestry Building, World's Fair.

People who live south of the World's Fair grounds and enter by the extreme south eastern gate catch a good many exhibits missed by the men who enter by the Esquimaux village three miles away. After tramping across sand and prairie from their hotels, they show a predilection for sitting on the shady side of the Forestry Building and resting awhile before commencing the serious task of examining the Exposition. Almost invariably they enter the Forestry Building, and, if they are people of taste, with eyes which appreciate beautiful things, remain there until they have mastered its contents.

There has never before been seen such a show of woods, in the rough and finished states, as this building contains. It is itself constructed of an immense variety of woods collected from every State in the Union. Interesting as this may be to the lumber man and builder, they do not catch the eye of the visitor who is looking for the beautiful and the curious as do the specimen woods exhibited within. Here again the States are represented and many of the countries of the world. There is instruction and education in even a cursory glance at the exhibits; but if the

visitor is inclined to go deeper and seek information from the men in charge, there is more to be learned than a week's study will enable him to assimilate.

India's Exhibit Interesting.

Especially fruitful of interest is the exhibit made by British India. As a Government exhibit, in which private enterprise is in no way interested, it is both complete and authoritative It illustrates not only the varieties of woods found in British India, but also the methods used in the Department of Forestry, which is fast becoming considered as important as any great governmental enterprise. Outside of the mercantile value of the timber, the chief interest of the exhibit for American visitors lies in the fact that the science of forestry as practiced in India affords a great many practical lessons for the United States. Here, as there, the destruction of timber lands is becoming an important question both on account of its influence on the climate and the lessening of a very necessary commercial product, and many of the same remedies apply to both. Forestry in India is a comparatively modern institution. There can be little doubt that in prehistoric times when the climate of the country was less fierce than now, the greater part of the country was covered with dense forests but the hands of invading hordes from the north were perpetually turned against them, and thousands of square miles disappeared by fire. When the English took possession, a new impetus was given to the destruction of forest as further vast areas were denuded to increase the area of cultivation. There soon came a time, however, when the attention of the Government was drawn to the lessening of the forests by the lack of timber in certain districts for public works.

Forestry made a Science.

Then the Forest Department came into existence and forestry became a science in India. Acts were passed for the creation of Government reserves, for the constitution of village forests and for the provision of police rules necessary for the protection of forests and forest produce. The department was officered by men who had received training in scientific forestry in England, France and Germany. Most Indian forests are of a mixed character, containing only one or a few valuable species which will repay the cost of working. Contractors handle the products of Government forests under the supervision of department officals. The deciduous forests, which occupy the greater part of the peninsula, Burmah, and the Andaman islands, are of the greatest importance for the forester, the consumer, and the Government. They contain well-known and valuable species of timber, such as teak, sal, ironwood

sandalwood, red sanders and padouk. The first and the last named have the most promising future. Padouk, or "vermillion," as it is called by American importers, is reckoned a better wood than teak, lasting longer and being handsomer. It is the best wood for carriage building and will one day rival mahogany for cabinet work. Teak takes the first place, however, in the estimation of visitors to India's section in the Forestry Building, for from it has been carved a magnificent doorway which is the equal of the best wood-carving to be found in the Exposition. This is the work of a Burmese carver in Mandalay and was executed by him to the order of the Conservator of Forests for Upper Burmah.

Beautiful Specimen of Carving.

The general outlines and designs are the same as those used in the throne of the King of Burmah. It stands fourteen feet high and is proportionately broad. Every inch of post and lintel and folding doors is carved with curious mythological figures, images of Buddha and minor deities. Below, it is supported by two dragons, which, as do all the figures, display more than a trace of Chinese art, induced by the intercourse between China and Upper Burmah. The best carving is contained in a triangular space above the door, which is designed to show the city of Mandalay with the King and his courtiers. Of three tiers in the triangle, the first shows one of the famous seven gates of the city surrounded and guarded by evil spirits; the second shows the King's ministers, and the highest tier the King and his Queens in the palace. Other valuable pieces of carving are exhibited to show to what uses India's woods may be put. A mantelpiece made of half a dozen varieties was wholly designed and carved by the Sikh carpenters. A cabinet and tables show what a fine polish padouk will take; and two stands for flower vases are carved in representation of a pelican standing upon four turtles.

For the student, a variety of maps, diagrams and instruments illustrate the methods employed in mapping out forest areas and the precautions taken against fire. Commercial men will find besides the timbers a full exhibit of tree products, resins, oil and gums.

Another correspondent has kindly sent us the following cutting from the Chicago 'Daily Inter-Ocean' regarding the carved teak doorway which was sent as an exhibit to the World's Fair by the Burma Forest Department. We feel sure that it will amuse our readers as it has amused us. Our Madras readers will not fail to be surprised at the antiquity of Vijianagar; our Burma subscribers will not les be astonished to hear that the Kings of Burma were Hindoos and our Insp ector-General will read with some amazement how the great doorway was carved in the snug recesses of his Simla retreat.

Wood Carving in India.

Art attracts in the Indian exhibit, adjoining the Japanese at the north end of the building. Native workmen and native wood have combined to present an exhibit, which would be numbered among "the seven wonders of the world," were they to be named and grouped at the Columbian Exposition. The exhibit consists of a massive double door, with lintel, sill and frame, carved from teak wood. Ponderous, high and wide, the carving has been so daintily wrought that the doors look as if they were web and the whole piece looks frail and perishable, while in fact doors, frame and the handiwork of the craftsmen is durable as time, for teak wood is as imperishable as bronze, more enduring, for just alongside of these doors is a handsomely carved mantelpiece, cut, chiseled and polished from teak wood 600 years old; hopwood, walnut, and fragments of blackwood, the Shisham of the Bible, taken from the ruins of the presidency of Madras, whose erection ante-dates the Christian era.

The teak doors are most elaborately and skillfully carved; figures, mythological, allegorical and representative abound. Scenes about Mandalay, the capital of Upper Burmah, are portrayed; the king enthroned, surrounded by courtiers; heraldic accounts and legends are carved in relief while the figures great and minute are surrounded by intricately wrought scrolls and delicate tracing, lace-like in fineness. The doors are the reproduction of the entrance to the palace at Mandalay, made of the same wood and which have swung to and fro for many, many generations of Hindoos. The reproduction is the work of six native carpenters who carved the gigantic doors at Ava Lodge, Simla, under the supervision of the British Conservator of Forests of the Eastern Circle of Upper Burmah.

India, divided into the presidencies of Bombay, Bengal and Madras, has a large exhibit, every district of the vast empire being represented. Teak, yellow and black in color, a tough, fine-grained and everlasting wood, is commercially the most valuable, and while suitable for furniture, is so universally useful that in ship-building it is found to have no equal to stand the buffeting of storms, the change of climate and the encroachments of boring sea insects. Having an inexhaustible forest supply, the woods of India are countless in variety, valuable commercially and there is scarce a variety that is not serviceable. Childhood's geography has pictured the famous banyan tree, whose branches stretch out, descend and taking root again, make an arcade of shade. This tree is the most useful on earth for shade purposes, and in a country where the sun is ever in an angry mood, red hot, has its rivals among the merchantable woods of the river valleys and the mountain ranges of Hindostan.

Japanese Camphor.

An interesting account of the production and trade in camphor in Japan is contained in the last British consular report from Hiogo The camphor tree of Japan is a huge evergreen of singularly symmetrical proportions and not unlike a linden. Its blossom is white flower, and its bears a red berry. Some trees are fully 15ft. in diameter and are upwards of 30 years old. The annual export of Japan camphor averages about 5,000,000 lbs., of which about a quarter reaches the United States either direct or *viâ* Europe, excepting a small quantity sent to India. The districts in Japan famed for camphor trees are Klushiu, Shikoku, Iga, Suruga Isé, and Kishiu. The forests owned by the people are now almost denuded of timber, and very little will be left a few years hence, but the Government forests are still very rich in camphor trees, and it has been estimated that these alone will maintain annually, during the next 25 years, the full average supply of crude camphor. Formerly very little care was bestowed upon the preservation and cultivation of this valuable timber. More recently, however, not only the Government, but also the people, have been giving to it the attention it long ago deserved. Numerous young trees have now been planted, and their growth is being carefully tended. Consequently, although hitherto the youngest wood from which camphor was extracted was about 70 or 80 years old it is expected that, under present scientific management, the trees will give equally good results after 25 or 30 years. The roots contain a much larger proportion of camphor than the trees, 10lbs. of crude camphor out of 200lbs. of wood chips being thought satisfactory. The Suruga timber yield a much smaller percentage. In a village in Tosa there is a group of 13 trees about 100 years old. It has been estimated that they will produce 40,000 lbs. of crude camphor, and are worth, as they now stand, 4,000 silver dollars. It appears that the process of extracting camphor from the wood among the mountains and the materials used are of the roughest and most unscientific description. The wood-chips are boiled, the vapour being conducted into a receptacle containing several partitions surrounded by cold water. In the sides of these partitions are apertures alternating in contrary directions, which when open cause the vapour to fill the divisions by a circuitous route, thus improving the grain of the camphor. The crude article is brought to market in very rude wooden tubs. To make it fit for shipment requires much work and experience. Each tub is carefully sampled vertically and diagonally, and the samples are tested by fire and sometimes by alcohol. If no solid adulterant is discovered, the condition of the drug is next ascertained, for crude camphor contains a quantity of water, or oil and water, varying between 5 and 20 per cent. The rest of the work is comparatively easy, and consists in weighing, cutting, mixing, and packing for shipment, packing being in tubs prepared on the premises partly out of the original packages.

Churchill and Sim's Circular.

November 3rd, 1893.

East India Teak,—The deliveries for the first ten months have been 11,276 loads as compared with 8,434 loads and 12,321 loads for the same period of 1892 and 1891 respectively. In October, the figures for the three years are 1158 loads for 1893, 778 loads in October 1892, and 929 loads in October 1891. The market has been steady, without change for quotation. The market for wood afloat has been rather stronger, but is now in suspense until the result of the tendering for the requirements of the British Admiralty are known. These will absorb fairly considerable quantities and will be taken entirely from Burmese ports in accordance with official precedent.—

Rosewood.—The demand is dull and to effect sales concessions in price are necessary.

Satinwood.—Logs, If large and figury, realise very fair prices, but plain wood is dull of sale and for *planks* and *boards* there is no demand.—

Ebony.—Prices continue to rule low, but there is now rather more enquiry for this description.—

Price Current.

India Teak	...	per	load	£ 9-10s.	to	£15-10s
Satinwood	...	„	ton	£ 5	to	£12.
Rosewood	...	„	„	£ 5	to	£ 9.
Ebony	...	„	„	£ 5	to	£ 7.

Cawnpore Price Current.

November 30th, 1893.

		Per Maund						
		Rs.	As.	P.		Rs.	As.	P.
Aonla fruits, dried	...	0	10	0	to	0	12	0
„ leaves, dried	...	1	12	0	to	2	0	0
Babul bark	...	0	8	0	to	0	9	0
Bahera	...	1	8	0	to	1	10	0
Stick Lac	...	24	0	0	to	25	0	0
Myrabolams	...	3	8	0	to	3	12	0
Moonj grass	...	1	4	0	to	1	8	0
Babul gum	...	8	0	0	to	12	0	0
Mixed gum	...	9	0	0	to	10	0	0

2.—MADRAS GAZETTE.

23rd October 1893 —No. 538 —M R. Ry. V. Alwar Chetty Garu, B. A., Extra Assistant Conservator of Forests, is granted privilege leave for one month, in extension of the leave for one month granted by the Board of Revenue, under article 291 of the Civil Service Regulations.

4th November 1893 —No. 540.—

No.	Name and designation of officer.	Present grade.	Grade to which promoted or reverted.	Nature of promotion or reversion	Remarks showing cause of vacancy, &c.
1	Mr. A. W. Lushington	Acting Deputy Conservator of Forests, Second Grade	Deputy Conservator of Forests, Third Grade.	Permanent.	With effect from 10th October 1893.
2	Mr. H. J A. Porter.	Deputy Conservator of Forests, Third Grade	Deputy Conservator of Forests, Second Grade.	Acting.	

No. 541.—

No.	Name of officer.	District.	Nature of charge	Remarks.
1	Mr. T. P. Peake ...	Madura ...	District Forest Officer.	To join on return from leave.

13th November 1893.—Mr. F A. Lodge, Deputy Conservator of Forests, Madras, has been permitted by the Right Honorable the Secretary of State for India to return to duty within the period of his leave.

23rd November 1893 —No. 567.—Mr. J. T. Lever, Forest Settlement Officer, Kurnool, &c., Districts, is granted privilege leave for three months, under article 291 of the Civil Service Regulations.

3.—BOMBAY GAZETTE.

30th October 1893 —No 7,981.—His Excellency the Governor in Council is pleased to appoint—

Mr. H. W. Keys, on return from leave, to do duty as Divisional Forest Officer, Khandesh ;

Mr. E. G. Oliver to do duty as Divisional Forest Officer, Sholapur.

31st October 1893.—No. 8007.—Mr. Bhagvandas Harkisondas Dalal, Extra Assistant Conservator of Forests, West Khandesh, passed an examination in Maráthi according to the Higher Standard on the 12th October 1893.

31st October 1893.—No. 8008.—Rao Saheb Annaji Balaji Pandit, Head Accountant, Surat, passed the prescribed examination in Accounts on the 10th October 1893.

31*st October* 1893.—No. 8009.—Mr. Bhagvandas Harkisandas Dalal, Extra Assistant Conservator of Forests, West Khandesh, passed with credit on the 12th October 1893 the examination prescribed in Rule, 6 of the Rules published in Government Notification No. 2878 dated 4th June 1880, for the examination of Forest Officers.

2. Mr. Dalal passed the examination in subject No. 1 in Maráthi.

25*th October* 1893.—Mr. G. J. Rege, Acting Extra Assistant Conservator, delivered over and Mr. Robinson, Extra Assistant Conservator, received charge of the Sub-Divisional Office, Kolaba, on the 10th October, 1893, before office hours.

10*th November* 1893.—Mr. G P. Millet, Deputy Conservator of Forests, Fourth Grade, and Mr. T. B Fry, Deputy Conservator of Forests, Second Grade, respectively delivered over and received charge of the Divisional Forest Office, Working Plans, N. C., on the 6th of November 1893, before noon.

12*th November* 1893.—Messrs. T. R. D. Bell and H. Mainwaring respectively delivered over and received charge of the Divisional Forest Office, Bijapur, in the afternoon of 1st November 1893.

12*th November* 1893.—Mr. Mainwaring relinquished charge of the Divisional Forest Office, Working Plans' Party I, Southern Circle, to Mr. C. M. Hodgson in the afternoon of the 1st November 1893.

Messrs. Hodgson and Bell respectively delivered over and received charge of the Divisional Forest Office, Working Plans Party II, Southern Circle, in the afternoon of the 1st November 1893.

17*th November* 1893.—Mr. T. R. D. Bell, Deputy Conservetor of Forests, delivered over and Mr. W. A. Talbot, Divisional Forest Officer, Northern Division of Kanara, received charge of the Divisional Forest Office, Dharwar, on the afternoon of the 3rd November 1893.

23*rd November* 1893.—Mr. Hasanali Mahomedali, acting Extra Assistant Conservator of Forests, and Mr. V. P. Rebeiro, Extra Assistant Conservator of Forests, respectively delivered over and received charge of the Bassein Sub-Division Office on the 16th November, before noon.

27*th November* 1893.—No. 8763.—Mr. L. S. Osmaston, Assistant Conservator of Forests, First Grade, has been allowed by Her Majesty's Secretary of State for India to return to duty within the period of his leave.

4.—Bengal Gazette

28*th October* 1893.—No. 4394.—Mr. F. Trafford, Assistant Conservator of Forests, who was granted leave for six months on medical certificate under the orders contained in the Notification No. 2375 For. dated the 24th June, 1893, has been granted an extension of leave for three months by the Secretary of State for India.

6*th November* 1893.—No. 4508.—Mr. C. A. G. Lillingston, Deputy Conservator of Forests and Personal Assistant to the Conservator of Forests, Bengal, is transferred to the Darjeeling Forest Division for general duty.

13*th November* 1893.—No. 4626.—Mr. C. C Hatt, Assistant Conservator of Forests, 1st Grade (provisional), is appointed to officiate in the 4th grade of Deputy Conservators, *vice* Mr. H. H. Haines on privilege leave, with effect from the 24th July 1893 and until further orders.

5.—N. W. P. AND OUDH GAZETTE.

23*rd November* 1893.—No $\frac{3570}{11-851}$.—Mr. C. C. Abbey, who has been appointed to the Forest Department by the Secretary of State for India, and who reported his arrival in Allahabad on the 22nd November 1893. to be an Assistant Conservator of Forests, 2nd grade, and to be posted to the Kheri Div sion of the Oudh Circle.

30*th November* 1893 —No. $\frac{3632}{11-86A}$.—The following reversions in the Forest Department are notified for general information :—

Entry number.	With effect from—	Consequent on—	Name.	From—	To—
1	10th October 1893...	Mr. B. A. Rebsch's return from privilege leave.	Mr. M. Hill ...	Officiating Deputy Conservator of Forests, 3rd grade.	Officiating Deputy Conservator of Forests, 4th grade.
			,, J. C. Tulloch...	Officiating Deputy Conservator of Forests, 4th grade.	Officiating Assistant Conservator of Forests, 1st grade.
2	1st November 1893.	Mr. E. A. Down's return from furlough.	,, B. A. Rebsch ...	Officiating Deputy Conservator of Forests, 3rd grade.	Deputy Conservator of Forests, 4th grade.
			,, A. P. Grenfell.	Officiating Deputy Conservator of Forests, 4th grade.	Assistant Conservator of Forests, 1st grade.
3	2nd November 1893.	Mr. W. Shakespear's return from privilege leave.	,, F. B. Bryant...	Officiating Deputy Conservator of Forests, 2nd grade.	Deputy Conservator of Forests, 3rd grade.
			,, A. G. Hobart-Hampden.	Officiating Deputy Conservator of Forests, 3rd grade.	Deputy Conservator of Forests, 4th grade.
			,, B. B. Osmaston	Officiating Deputy Conservator of Forests, 4th grade.	Assistant Conservator of Forests, 1st grade.

3640

30th November 1893.—No. $\frac{11-851}{}$.—Mr. H. G. Billson, who has been appointed to the Forest Department by the Secretary of State for India, and who reported his arrival in Allahabad on the 30th November 1893, to be an Assistant Conservator of Forests, 2nd grade, and to be attached to the Direction Division of the School Circle.

6.—PUNJAB GAZETTE.

31st October 1893.—No. 541.—Mr. L. Gisborne Smith, Deputy Conservator of Forests, and Bhái Sádhu Singh, Extra Assistant Conservator of Forests, respectively made over and received charge of the Hazára Forest Division on the afternoon of the 25th September 1893, consequent on the former's departure on the privilege leave for three months granted him in Punjab Government Notification No. 458, dated the 28th August 1893.

16th November 1893.—No. 580.—Mr. C. P. Fisher, Officiating Deputy Conservator of Forests, Punjab, is granted privilege leave for three months, under Articles 277 and 291 of the Civil Service Regulations, with effect from the 1st January 1894 or such subsequent date as he may avail himself of it.

21st November 1893.—No. 597.—Messrs G. S. Hart, Officiating Deputy Conservator of Forests, and G. G. Minniken, Deputy Conservator of Forests, respectively made over and received charge of the Simla Hill Tracts Division on the forenoon of the 21st October 1893, consequent on the former's departure on the privilege leave granted him in Notification No. 513, dated the 9th October 1893.

28th November 1893.—No. 605.—His Honor the Lieutenant-Governor of the Punjab is pleased to make the following promotion on the amalgamated list of Forest Officers in the Punjab, Central Provinces, Coorg and Berar with effect from the 2nd May 1893:—

Mr. C. Somers Smith, Assistant Conservator, 2nd Grade to be Assistant Conservator, 1st Grade.

Mr. Somers Smith's place on the list will be between Messrs. Lowrie and Hart.

7.—CENTRAL PROVINCES GAZETTE.

2nd November 1893—No. 5121.—On return from the leave granted him by Notification No. 3113, dated the 30th August 1892, Dr E. Dobbs, M. A., LL. D., Deputy Conservator of Forests, is posted to the Nagpur-Wardha Forest Division.

2nd November 1893—No. 5122.—Dr. E. Dobbs, Deputy Conservator of Forests, returned from the leave granted him by Notification No 3113, dated the 30th August 1892, and with reference to Notification No. 5121, dated the 2nd instant, assumed charge of the Nagpur-Wardha Forest Division from Mr. Chander Kumar Chatterji, Extra-Assistant Conservator of Forests, on the forenoon of the 25th ultimo.

2nd November 1893—No. 5123.—Privilege leave for three months, under Article 291 of the Civil Service Regulations, is granted to Mr. S. G. Pranjpe, Forest Divisional Officer, Damoh, with effect from the 17th October 1893.

2nd November 1893—No. 5124.—On being relieved by Mr. Rind of the charge of the Narsinghpur Forest Division, Mr. Syed Ali Muttaki is posted to the charge of the Damoh Forest Division, to work under the immediate orders of the Deputy Commissioner during Mr. Pranjpe's absence on leave, or until further orders.

2nd Novemebr 1893—No 5125.—Mr. S. G. Pranjpe, Extra-Assistant Conservator of Forests, Damoh, availed himself, on the afternoon of the 16th ultimo, of the three months, privilege leave granted him by Notification No. 5123, dated the 2nd instant, making over charge of his duties to Mr. Syed Ali Muttaki, Senior Forest Ranger.

2nd November 1893—No. 5126 —Mr. M. Muttannah, Extra-Assistant Conservator of Forests, Mandla, availed himself, on the forenoon of the 25th September 1893, of the three months' privilege leave granted him by Notification No. 3944, dated the 22nd August 1893, making over charge of his duties to Mr. W. King, Deputy Conservator of Forests.

2nd November 1893—No. 5127.—On return from the three months' privilege leave granted him by Notification No. 3668, dated the 8th August 1893, Mr. G F. Taylor, Deputy Conservator of Forests, is posted to the charge of the Saugor Forest Division.

2nd November 1893—No. 5128.—On being relieved of the charge of the Saugor Forest Division by Mr. G. F. Taylor, Deputy Conservator of Forests, Mr. L. A W. Rind, Deputy Conservator of Forests, is posted to the charge of the Narsinghpur Forest Division.

2nd November 1893—No. 5129.—Mr. G. F. Taylor, Deputy Conservator of Forests, returned, on the 1st ultimo, from the privilege leave granted him by Notification No. 3668, dated the 8th August 1893, and with reference to Notification No. 5127, dated the 2nd instant, assumed charge of the Saugor Forest Division from Mr. L. A. W. Rind, Deputy Conservator of Forests, on the forenoon of the 4th ultimo.

The unexpired portion of his leave is hereby cancelled.

2nd November 1893—No. 5130.—Mr. L. A. W. Rind, Deputy Conservator of Forests, posted to the charge of the Narsinghpur Forest Division by Notification No. 5128, dated the 2nd instant, assumed charge of his duties from Mr. Syed Ali Muttaki, Senior Forest Ranger, on the forenoon of the 10th ultimo.

2nd November 1893—No. 5131.—On being relieved of the charge of the Bilaspur Forest Division by Mr. Blunt, Deputy Conservator of Forests, on return from privilege leave, Mr. H. Moore, Deputy Conservator of Forests, is posted to the charge of the Betul Forest Division.

21st November 1393—No. 5444.—Mr. A. W. Blunt, Officiating Deputy Conservator of Forests, returned from the three months' privilege leave granted him by Notification No. 3851, dated the 1.th August 1893, and resumed charge of the Bilaspur Forest Division from Mr. H. Moore, Deputy Conservator of Forests, on the forenoon of the 10th instant.

8.—BURMA GAZETTE.

20th October, 1893.—No. 407.—Under the provisions of Articles 277 and 282 *(a)* (1) of the Civil Service Regulations Mr. H. N. Thompson, Assistant Conservator of Forests, is granted privilege leave for three months and 16 days, with effect from the date on which he may avail himself of it.

No. 408.—Mr. C. W. A. Bruce, officiating Deputy Conservator of Forests, is appointed to hold charge of the Upper Chindwin Forest division in addition to his other duties till further orders.

21st October, 1893.—No. 409.—Mr D. L Richardson, Myoôk, is appointed a Forest Settlement Officer to succeed the Deputy Commissioner, Bhamo, for the purpose of the enquiry ordered in this department Notification No. 302, dated the 10th August 1893.

No. 410.—The Forest Officer in charge of the Bhamo Forest division is appointed to be the Forest Officer who shall assist the Forest Settlement Officer in the enquiry ordered in this department Notification No. 302, dated the 10th August 1893.

No. 411.—Mr D. L. Richardson, Myoôk, is appointed a Forest Settlement Officer, to succeed the Deputy Commissioner, Katha, for the purpose of the enquiry ordered in this department Notification No. 366, dated the 22nd September 1893.

No. 412.—Mr. E. A. O'Bryen, Deputy Conservator of Forests, is appointed to be the Forest Officer who shall assist the Forest Settlement Officer in the enquiry ordered in this department Notification No 366, dated 22nd September 1893

No. 413.—Mr D. L Richardson, Myoôk, is appointed a Forest Settlement Officer to succeed the Deputy Commissioner, Katha, for the purpose of the enquiry ordered in this department Notification No 323, dated the 17th August 1893.

No. 414.—Mr. E. A. O'Bryen, Deputy Conservator of Forests, is appointed to be the Forest Officer who shall assist the Forest Settlement Officer in the enquiry ordered in this department Notification No. 322, dated the 17th August 1893.

No 415.—Mr. D. L. Richardson, Myoôk, is appointed a Forest Settlement Officer to succeed the Deputy Commissioner, Bhamo, for the purpose of the enquiry ordered in this department Notification No. 303, dated the 10th August 1893

No. 416.—The Forest Officer in charge of the Bhamo Forest Division is appointed to be the Forest Officer who shall assist the Forest Settlement Officer in the enquiry ordered in this department Notification No. 303, dated the 10th August 1893.

No. 417.—Mr. D. L. Richardson, Myoôk, is appointed a Forest Settlement Officer to succeed the Deputy Commissioner, Katha, for the purpose of the enquiry ordered in this department Notification No. 323, dated the 17th August 1893.

No. 418.—Mr E. A. O'Bryen, Deputy Conservator of Forests, is appointed to be the Forest Officer who shall assist the Forest Settlement Officer in the enquiry ordered in this department Notification No. 323, dated 17th August 1893.

20th November, 1893.—No. 9.—Mr. J. Copeland, Deputy Conservator of Forests, reported his return from the leave granted him in Revenue Department Notification No. 382 (Forests), dated 7th October 1893, on the forenoon of the 14th instant.

No. 10.—With reference to Revenue Department Notification No. 455 (Forests), dated the 15th November 1893, Mr. C. R. Dun, Assistant Conservator of Forests, made over, and Mr. J. Copeland, Deputy Conservator of Forests, received charge of the Mandalay Forest division, on the forenoon of the 17th instant.

15th November, 1893.—No. 98.—Mr. C. W. Palmer, Deputy Conservator of Forests, made over charge of Minbu Forest division preparatory to availing himself, on the afternoon of the 8th November 1893, of the one year's furlough granted him in Revenue Department Notification No. 440 (Forests), dated the 4th instant.

No. 29.—With reference to Revenue Department Notification No. 441 (Forests), dated 4th November 1893, Mr. C. W. Palmer, Deputy Conservator of Forests, made over, and Mr. A. M. Burn-Murdoch, Assistant Conservator of Forests received charge of the Minbu Forest division, on the afternoon of the 8th November 1893, in addition to his other duties.

20th November, 1893.—No. 30.—Mr. C. L. Toussaint, Deputy Conservator of Forests, reported his return from the three months and 15 days' privilege leave granted to him in the Revenue Department Notification No. 279 (Forests), dated the 1st August 1893, and resumed charge of the Yaw Forest division from Mr. H. H. Forteath, officiating Deputy Conservator of Forests, on the forenoon of the 13th November 1893.

9.—Assam Gazette.

16th November, 1893.—No. 10964G.—Furlough for one year, under article 371 *(a)*, of the Civil Service Regulations, is granted to Babu Jogesvar Sur, Extra Assistant Conservator of Forests, in commutation of the two months' privilege leave granted in Notification No. 8,487G., dated the 24th August 1893.

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Bhabar Grass, and the Trade in it.

This grass, the *Ischæmum angustifolium*, Hackel, is an important and valuable paper-making material, similar to the "Esparto" grass of Spain and the "Alfa" of Algeria.

It is found only on poor soils in broken country in Central and Northern India, from the Godávari up to the lower slopes of the Himálaya and the lower Himálayan valleys. It is especially common in the Siwalik hills, and extends from Afghanistan along the hills to the Ganges or beyond it to similar localities down through the Garhwal and Kumaon lower hills into Oudh, Nepal, and Sikkim, where it is scarce however.

In the Central Provinces it occurs on poor lands in broken country, and extends thence eastwards into Chota Nagpore and through the hill states into Orissa and the Circars, where it is chiefly found upon laterite and on the stiff clays of the poorer forests. It is doubtful if it is found far south of the Kistna river, but it extends eastwards through Burma into China.

Its botanical identification was for long uncertain. The fact that in some parts of India, and notably in the Siwaliks, it is found in localities where a species of sedge, the *Eriophorum comosum*, is also common, it was at first supposed to be that species, which however, it may be noted, is cut and used indiscriminately with the true Bhabar.

In the 'Bulletin of Miscellaneous Information', published at the Royal Gardens, Kew, for 1888, page 157, is published a full account of the subject, and it is there recorded that specimens of the true "bhabar" were in 1879 sent to England by Mr. J. F. Duthie, then Superintendent of the Government Botanical Gardens at Saharanpur. These, though imperfect, were identified by the late General Munro, C.B., F.R.S., then the greatest living British authority on grasses, as being the *Spodiopogon angustifolius* of Trinius (*species Graminum* t. 336). In 1883 it was discussed by Mr. W. T. Thiselton Dyer, F.R.S., under the name *Pollinia eriopoda*, Hance, in Volume XX of the Journal of the Linnean Society, page 409. In 1887-88 it was figured in plate 1773 of Volume VIII of Hooker's 'Icones Plantarum' with a description by Professor D. Oliver, who first published the name which Professor Hackel was about to give it, and under which it appears in his Monograph of the *Agrostideæ—Ischæmum angustifolium*.

In 1882-83 Dr. G. King, Superintendent of the Royal Botanical Gardens, Calcutta, quoted in the Kew Bulletin, gave the following information in his annual report:—

"In several former reports I have referred to the leaves known by the vernacular name Bhabar as the produce of *Eriophorum comosum*. I have now satisfied myself that the bulk of the Bhabar used by natives for rope-making is not derived from *Eriophorum*, as I have supposed, but from *Andropogon involutus*. This grass I find from enquiry locally made abounds in the hill parts of Behar and Chota Nagpore, where it is known as Sabai. From these regions it can be obtained in quite considerable enough quantity to make its utilization as a paper

material a feasible project, and the people who actually collect it sell it at a reasonable enough rate. But in order to get it brought to Calcutta in sufficient quantity for local manufacture, or for shipment to Europe, middlemen have to be employed, whose ideas of profit are pitched so high that, until they become modified, the utilization of Bhabar must remain in abeyance. This is only in accord with the common experience in the mofussil, that competition in trade is not sufficiently keen to have much effect in keeping down prices, but that, on the contrary, traders still form guilds banded together to enhance prices, even at the risk of choking off demand."

Again, in 1883, the late Mr. Thomas Routledge, the paper manufacturer of Sunderland, gave the Kew authorities the following as the result of his trials of the grass :—

"I believe it will make a fair sheet of paper, much the same as fine Esparto; in fact, in many respects, as a natural product, it closely resembles Esparto, but does not contain so much glutinous and amylaceous matters, nor so much silica. The sample sent, you will remark, was cut, and not pulled from the roots as Esparto is. Like Esparto, *in situ* it is worth very little, and is used for similar purposes—roping, matting, baskets, etc. The cost of Esparto consists in collection, carriage to port of shipment, and, latterly, baling charges, freight to England, etc. Whether from India, with long and probably costly inland carriage, with heavy freight added, it can come into competition with Esparto is doubtful, and I do not think it would pay to convert it into stock."

The Manager of the Lucknow Paper Mills, Mr. C. E. Edwards, also wrote in 1883 to the Director of Agriculture in the North-Western Provinces and Oudh as follows :—

"This grass we have used here, but not to any great extent, owing to the price being too high; besides the outturn is not so great as with jute. I found it not to yield more than about 35 per cent. of paper. This is to a great extent owing to the top part of the plant being somewhat perished; I presume owing to the tops being more exposed to the atmosphere, as this part appears to get ripe much earlier than the bottom. In the process of boiling the perished or top part gets destroyed before the bottom part of the stem gets sufficiently reduced to a pulp. This accounts for the great loss in the manufacture; but this could be obviated by having the top parts cut off before despatching it to the paper mills, and if it could be had at the same price with the tops off, I have no hesitation in saying it would be a good and cheap enough fibre for paper-making purposes."

At the suggestion of the Inspector General of Forests to the Government of India, in Circular No. 10 of 21st October 1891, a report on the subject of the trade in, and supply of, this valuable grass from his division was made by Mr. L. Mercer, Deputy Conservator of Forests of the Saharanpur Division, School Circle, North-Western Provinces and Oudh.

The following is Mr. Mercer's report :—

"This grass forms one of the most important products of the Saharanpur Forest Division. It is found only in the broken hilly ground of the Siwalik hills, not in the plains, grows principally in tufts, flowers in February and March, the seeds being obtainable in March and April. The system of export is as follows :—

"The different blocks of the forest are let out to contractors, who farm the produce. The contracts are given from the 1st October to the end of February. The grass itself is taken out by head-loads, the rate being nine pice per load, by donkey-load the rate being two annas three pies, by pony-load at three annas per pony, and per cart-load at twelve annas per two-bullock cart. The first is, however, the general method of export The average weight of a head-load is about a maund, the weight of the other loads being in proportion to the rates charged. For a month or six weeks

after the contractors' leases have expired, tickets are given at the different forest chaukis at the abovementioned rates. All export stops about the middle of April, or sooner if the season is exceptionally dry, on account of danger to the forests from fire. The chief uses of this grass are—

"(1) for rope-making;
(2) for small brooms;
(3) for paper-making.

"(1) *For rope-making.*—The ropes are manufactured in nearly all the villages in the vicinity of the forests, and also in the Saharanpur, Meerut, and Bulandshahr districts. In the villages in the vicinity of the forests, as a rule, only small ropes are made, used for thatching and making the common native bedsteads. This rope sells in the villages at one rupee per 30 to 35 seers; when taken to Saharanpur it realizes about R1 per 30 seers, and when to Dehra Dun R1 per 20 to 25 seers, these being the bazar rates.

"When taken down to the Meerut and Bulandshahr districts, the Ganges canal is made use of for conveyance, the grass going down in boats from Hardwar and Jwalapur. The buyers pay about R30 per 100 maunds at Jwalapur, and the canal freight down to the abovementioned two districts is R5 to R7-8 per 100 maunds. The prices obtained at Meerut and Bulandshahr vary from R60 to R80 per 100 maunds. On the canal heavy ropes and hawsers are manufactured for towing.

"(2) The next use that the grass is put to is the manufacture of small brooms for sweeping out houses, etc. These are sold in all the villages in the vicinity of the forests at the rate of 4 or 5 brooms to the anna.

"(3) The third use that the grass is put to is for paper-making. The paper manufactured is the yellow native paper used in all native correspondence and in the bazars. It is only in the neighbourhood of the Ganges canal and the Oudh and Rohilkhand Railway that grass is exported for paper-making. The details of prices, etc., are difficult to obtain, but from enquiry among the contractors the following account may, perhaps, be taken as fairly correct:—

"Formerly, about 10,000 maunds used to go down the canal and railway to Lucknow, the price obtainable there being R100 to R125 per 100 maunds of grass. The grass went by canal as far as Cawnpore and thence by rail. The canal rates were R17 to R20 per 100 maunds, and the railway freight about R20 per 100 maunds. This export has now practically ceased, as Lucknow obtains most of its grass from the forests of the Ganges Division, which is taken to the Chandausi Station and thence by rail.

"At the present time the grass from the Saharanpur Division is used by the Scindia Paper Mills, Gwalior, but the railway freight is so heavy (about R70 per 100 maunds) that no considerable trade takes place.

"This grass is eaten in the hills by cattle, and appears to contain a fair amount of nourishment.

"As regards the development of the trade in Bhabar grass from the Saharanpur forests, the outlook is not promising owing to the grass becoming dry and withered from fire-protection. This is probably the reason why the Lucknow mills do not now take grass from Saharanpur to any considerable extent. The grass from the Ganges Division is still good, as many parts of the forests are annually burnt over, with the result that a fresh crop of green grass springs up.

"If some Native or European capitalist were to set up paper mills at Jwalapur near the railway, and where there is unlimited water-power, they would probably pay very well."

In regard to the question of the effects of fire-protection on the demand for this grass, I can only say, from personal experience, that the amount which is still cut and exported from the forests of the southern face of the Siwaliks is very large indeed. I have several times visited the cutters in the forests, and find that, as they cut pretty regularly in the same places every year, the difficulty which

Mr. Mercer refers to is almost entirely obviated. But, in spite of the large amounts exported, the possible supply from the Siwaliks is so enormous that there is no chance of the grass becoming scarce under the protection of the forests from fire. The cutters can easily sift out the old leaves from the new, and do so, and so long as each tuft is cut yearly, the number of these dry leaves is very small. It must not be supposed that Mr. Mercer is desirous of advocating the cessation of fire-protection: he merely refers to the effect of fire being useful in facilitating growth of new leaves. Fire-protection would be a necessity of forest conservancy, even if its result were to destroy the trade in Bhabar. The annual yield from the Saharanpur Siwaliks is about 75,000 maunds, yielding a royalty to the contractors who lease the sale of produce of about Rs. 6,000.

In the Dehra Dun hills there is of course a good deal of the grass on the Siwaliks near the crest of the hills, and it may also be found more sparingly on low dry slopes of the Himálaya; but there is no export demand, and the grass is only utilized for local purposes.

A considerable amount of information has also been received from the Central Circle of the North-Western Provinces. In 1889 Mr. C. Bagshawe, the Conservator, wrote as follows:—

"Bhabar grass can be cut and exported from the Government forests between the Sarda and Ganges any time between 1st November and 1st March. The most accessible forests are—

"(a) in Kumaon Division near Haldwani, Rohilkhand and Kumaun Railway;

"(b) in Garhwal Division near Kalagarh, 20 miles from Nagina, Oudh and Rohilkhand Railway;

"(c) in the Ganges Division near Chila, 4 miles from Hardwar, Oudh and Rohilkhand Railway.

"The current rates for the grass are as follows:—

	R	a.	p.		R	a.	p.
"Per cart bullock . . .	0	6	0	Per pony	0	2	0
" " buffalo . . .	0	8	0	" donkey . . .	0	1	6
" camel	0	5	0	" banghy . . .	0	1	3
" buffalo . . .	0	2	6	" head-load . . .	0	0	9
" bullock . . .	0	2	0	" maund . . .	0	1	6

"The export of Bhabar grass is fairly large, and in addition to ordinary exports about 10,000 maunds have for some years past been removed for paper mills in Lucknow. I cannot give reliable figures as to cost, but believe the mills give R1-2 per maund (82 lbs.) delivered at Lucknow. The grass is cut and delivered by contractors. The grass is usually cut and stored at depôts at the foot of the hills by hill men, and is sold at varying rates to buyers who come up from the plains. Any one is free to cut and export Bhabar on payment of the dues. I doubt if Bhabar grass could be exported from India at a profit in competition with Esparto and other grass."

To this Mr. A. E. Wild, Conservator, has now added the information that, besides the manufacture of paper, of ropes, and brooms, it is also used in the making of mats, for thatching, and for caulking the planking of floors; and he has supplied the following interesting table showing the amounts exported and royalty realized on Bhabar grass in the three chief

divisions of his circle in which lie the forests of the outer Himálaya and the hills which continue the Siwaliks, *viz*, the Ganges, Garhwal and Kumaon :—

Year	Division.	Quantity exported.	Royalty realized.
		Mds.	R
1889-90	Ganges	49,985	2,951
1890-91	"	32,409	2,190
1891-92 . . .	"	34,059	2,474
1889-90	Garhwal	43,649	3,411
1890-91	"	40,554	2,611
1891-92	"	30,285	2,061
1889-90	Kumaon	16,587	1,153
1890-91	"	7,147	509
1891-92	"	3,125	229
	TOTAL .	2,57,800	17,589

From the Oudh Circle the following interesting note on "Baib" grass has been communicated by the Conservator, Mr. S. Eardley-Wilmot, whose remarks on the effect of fire-protection in causing the trees to grow and give a shade which is detrimental to the grass will be read with interest :—

"Baib grass is found growing almost exclusively on the poorer soils and open forests and on broken ground, richness of soil and shade being apparently inimical to its growth. The extension of fire conservancy has reduced the area on which the extraction of this grass can be carried on remuneratively ; for, not only does such protection result in improvement of the soil and its more complete overshadowing, but also the fact that the new and old crop cannot be separated in the cutting reduces the value of the outturn considerably. In fire-protected forests, where the Baib crop is of importance to the neighbouring community, this latter fact may often account for persistent and otherwise inexplicable incendiarism. The outturn of Baib in the various divisions of the Oudh Circle varies most considerably, being dependent not on the area but on the physical condition. In the Philibit and Bhira Divisions there are large areas of grass land on which the Sál tree, consequent on the presence of a stratum of clay at a short distance from the surface, appears as a shrub only. In other places the same effect is produced on large areas once cleared for cultivation or by injudicious fellings, and thereafter so maintained by the continuous action of frost and fire. On such areas the growth of Baib is luxuriant, and its extraction provides a useful industry to the neighbouring tenantry, who are accustomed to cut the crops on a system by which Government receives a part of the outturn in payment for the balance, which is removed for domestic requirements or for sale.

"This however is now being altered for a more manageable system of leasing the grass on certain areas.

"In the Kheri Division of the Circle there is practically no baib export. In the Fahraich Division along the edge of the Sâl forests, in the poorer soil of the Bhinga Range, and in the country at the foot of the low hills, there is a very considerable growth of Baib, which is in part cut departmentally and carted to the nearest railway station, where it is taken over by the agents of the paper mills, who consign it to its destination. Great progress has been made in this division in the export of this grass; presses have been erected (for the railway freight of unpressed grass is prohibitive), and it is hoped that next season the agents of the mills will lease the Baib-producing areas and arrange all cutting and carting without departmental aid. In the Gonda Division, where the main forests are on spurs f the outer ranges of low hills, there is also a large production of Baib, which is not fully utilized owing to the difficulties attendant on reaching the railway. In the Gorakhpur Division the export of Baib is insignificant. The export of Baib last season was approximately as follows:—

	Mds.
"Philibit and Bhira	4,000
Bahraich	8,964
Gonda	2,036

"The highest price obtained was R1-1-6 per maund. The average sale price amounted to 13 annas per maund, and it may roughly be said that the sale price of one maund of sound Baib delivered on the railway line is from 12 to 15 annas. The export of the grass is capable of considerable, but not indefinite, extension. With improvement of communications, there is no doubt but that the whole crop in the Oudh Circle will gradually be utilized, either in local industries or in paper manufacture. The mills which purchase Baib from this circle are the Couper Mills in Lucknow and the Bally and Titagarh Mills in Calcutta."

In the Central Provinces the grass, locally called "Babbai," is widely distributed, but is most especially found in the northern districts. Colonel Doveton, Conservator of Forests, Southern Circle, reports that—

"As far as I have been able to ascertain, the available supply in these provinces is fully utilized for local purposes. The consumption for string cots is very considerable, and it is preferred by the poorer classes to anything else for this purpose."

The following notes have been received from other Forest Officers in the Central Provinces:—

"In the Wardha District it apparently does not exist at all, and in Nagpur only in the East Pench Range, where it is known under the names of Soma and Babara grass.

"Its distribution is irregular, but it is found best developed in the fire-protected forests of the Sylari Khappa Block, and to the west of this, more especially in the vicinity of nallas.

"It is principally, if not solely, utilized for the manufacture of ropes of all sizes employed in field work, in the construction of country cots and carts, and in thatching.

"It is sold, not as collected, by cart or head-load, but by bundles, at the rate of R1 per bundle, or at from 2 to 4 annas per country cot.

"The grass is apparently but little known among the people, and its uses are inconsiderable." (H. S. Ker Edie, Forest Divisional Officer, Nagpur, Wardha Division.)

"This grass, I believe, is the same as the *Bhabar grass* mentioned in the memorandum by Mr. Mercer. It is found in all the forests of this district, on the hills and where the ground is slightly elevated and broken, not on low level ground.

"It is in demand for making strong twine in the manufacture of native bedsteads and for thatching, as mentioned by Mr. Mercer. It is not much used for large ropes, and is considered to rot on exposure to wet; when exposed on the outside of a thatch it requires renewing annually. It is not much used for brooms, it being

considered inferior to *Chir* grass for this purpose. It is however occasionally used for making brooms when 'Chir' is not available, but is not considered a marketable commodity. Baghai is not taken in this district, at least for paper-making.

"Baghai is at present included in the general head 'Grass,' and no separate account is taken of the quantity extracted. The rates charged are head-load R0-2-6, kawar-load R0 3-9, cart-load R3-6 for "thatching grass," and under these rates it is extracted, usually in head-loads and kawar-loads.

"Twine made from Baghai sells in the villages at 2 annas per gurna or bundle of 2 or 2½ seers. In Bilaspur much the same rates prevail." (A. W. Blunt, Forest Divisional Officer, Bilaspur.)

"The vernacular name of this grass here is 'Wawit.' It is found in fair quantities in the south of the district, confined to rocky beds of streams and along the slopes of hills in Sironcha and Ghoto, which are broken up and open. The time of flowering is somewhat earlier here than in the Siwaliks. I have seen it in flower in January and February in the hills of Sironcha.

"All the 'Wawit' grass-producing areas lie across the Weinganga river, and here commutation is in force, so that the villagers who cut and bring the grass out of the forest pay nothing extra to the 8 annas per house a year charged them. However, a fair quantity is also brought across the Weinganga in carts for rope-making, and for this 2 annas a cart-load is charged. The men who bring out the grass are chiefly Gonds and Marias, and it is made by them into rope and sold to Kunbis and others for grain generally. The rope seldom exceeds a quarter of an inch in diameter, and is generally one-eighth of an inch. The finer kind of rope is used by the poorer classes for stringing beds, but owing to the immense quantity of fine rope made from other good kinds of fibre, such as that obtained from 'Butea,' the 'Roselle' (which is very largely grown in villages trans-Weinganga), 'Hardwickia' and a few other trees, the 'Wawit' grass rope is not largely used for this purpose by the Kunbis and better classes of villagers. The most extensive use to which this grass is put is for making rough rope for stretching over the fields when the winter crop of 'Jawari' is beginning to ripen. This is done to prevent the birds destroying the grain while in the standing head. To one not accustomed to the sight it seems strange that such labour and trouble should be taken to keep off birds, but such is the case, and it is quite a sight passing along the Pranhita and Godavari rivers to see the miles and miles of rope all made from 'Wawit' grass strung up in the air and reaching to posts at all corners of the 'Jawari' fields from a centre machan erected for the keeper of the field. On seeing birds alight in his field he pulls the strings leading to that particular part, and on pulling these strings sets off rattles attached to the fastening on the outside edge of the field.

"Owing to the ease with which other fibres are obtained and their quantity no trouble is taken in the manufacture of good string from 'Wawit' grass." (A. E. Powrie, Forest Divisional Officer, Chanda.)

"Bhabar grass is called 'Panassi' in this district by the Uriyas. It is found in the Kulchur, Charbalikaman, Beherakaman, Birsing, and Ghichamura Reserves of the Sambalpur Range. These reserves occupy about 120 square miles. The grass is rarely, if ever, met with in the Barapahars. It grows principally in tufts on broken and more or less shingly soil.

"The new crop of grass springs up during the rains between 1st July and 31st October, and is fit for cutting in November and December. It is usually cut during the month of November, and exported by head-loads and kawar-loads, the rates being 2 pies per head-load and 3 pies per kawar-load, which is too low.

"The grass is converted into thin rope for thatching and for native cots and into thick rope for other purposes. The people living in the villages close to the forests are the ones who bring it out and convert it into rope. The grass itself, or the rope made out of it, is sold at Sambalpur, Dawa, Manesar, and Putiapali. The rates vary according to the season of the year. From November to February grass is sold at 5 annas per maund, during March and April at 6¼ annas per maund, and in May, June, and July at 10 annas per maund.

"When manufactured into rope one maund is sold at R2-8, R3-4 and R5, according to the season of the year as above.

"The amount exported from the Sambalpur Government Forests annually is about 2,500 maunds. About 2,000 maunds are also brought into the district from Bamra and Gadloising.

"There are no paper mills in this district, and the grass is not exported to any other district for sale. The quantity available is sufficient only for the local demand." (J. J. Hobday, Forest Divisional Officer, Sambalpur.)

"The grass in this part of the country is commonly known as *Son*, and chiefly used in rope-making. The rope made of it is called *ban*, and used largely for native bedsteads, and very rarely for other purposes. It lasts for a considerable length of time, but when exposed to rain, or comes frequently in contact with water, it rots and becomes useless. It is found only in well-drained localities, and grows generally in isolated turfs.

"The produce in this district is removed only under licenses. The quantity thus removed and the revenue realized therefrom for the last year 1891-92 are noted below:

	R	a.	p.
"2,803 head-loads at 1 anna each	175	3	0
3,248 kawar-loads at 1 anna 6 pie each . . .	304	8	0
Total .	479	11	0

"This grass when freshly cut is left to dry for a couple of days, and then removed in bundles and made into ropes, varying in size according to requirements. It takes over a week for a man to prepare *ban* of one head-load of the grass, and the *ban* so prepared is sold at markets in vicinity of forests at the rate varying from 16 to 21 khandis to a rupee.

"Forty khandis are generally obtained from each head-load, and each khandi consists of 20 ropes, each 30 feet long. An ordinary bedstead requires about 10 khandis of *ban*, which costs at the above rates from annas 10 to 7½." (Khem Sahib Munshi Muhammad Ghouse, Forest Divisional Officer, Balaghat.)

The following contribution is from Mr. R. H. E. Thompson, the Conservator of Forests of the Northern Circle:—

"The grass is found sparingly distributed, in favourable localities, throughout the Central Provinces, being confined generally, to the steep and almost bare hill-sides and ravines bordering the large river systems. It is nowhere found in a single locality in any large quantity; but because of its wide distribution over the enormous forest area of the Central Provinces, it would be safe to say that from 15,000 to 20,000 maunds of this grass, if a demand arose for it, could be collected yearly. It is reported from Mandla that the estimated yield of this grass from that Forest Division alone is 2,500 maunds.

"As regards its uses in the Central Provinces, these are confined to rope-making and the twisting into fine cord for the webbing of native bedsteads. Large quantities are collected for these purposes, and used up yearly by the resident population. None of it, however, is ever exported to places outside of the Central Provinces. The forest value of a head-load of this grass varies, according to the locality which furnishes it, from one anna to two annas.

"Fire-protection has as yet nowhere caused the disappearance of this grass, this being principally owing to its habitat, though the annual regrowth of it is more or less arrested in development owing to the presence within the clump of the dead blades of previous years."

From Bengal information has been received, through the kindness of the Conservator of Forests, Mr. E. P. Dansey, from the Divisional Forest Officers of Singhbum and Palamau in Chota Nagpore. The former writes:—

"This grass, known locally as "Sabai," grows most luxuriantly on dry sunny slopes and exposed situations. With the advent of the rainy season it begins to shoot out in tufts from the old clumps, and is mature in the months of October and

November, flowering in March and April, and ripening its seeds in May, when it curls up and dries.

"It grows abundantly in all the forests of Singhbhum. The fresh shoots are eaten by cattle. It is made into ropes, and is used in thatching and for native beds; and paper is also manufactured from it, principally the coarse yellow kind. It is sold departmentally at the following rates :—

"R1 per cart-load	=	about 10 maunds
Annas 6 per sagai-load . . .	=	4 to 5 maunds
„ 2 per banghy-load . . .	=	1½ maunds
Anna 1 per head-load	=	¾ maund.

"It has been exported from Singhbhum by the Bally, Titaghar, and Ranigunj Paper Mills. It is difficult to obtain exact information as to the cost of export; but the following rates per maund are probably very nearly accurate, the nearest railway station being supposed to be about 20 miles distant from the forest whence the grass is obtained and 272 miles from Calcutta :—

	R	a.	p.	
"Royalty	0	1	8	per maund.
Cutting and drying at depôt near forest	0	4	0	„
Packing and pressing by machinery	0	2	0	„
Carriage to railway station by cart	0	3	0	„
Freight to Calcutta by rail . . .	0	5	0	„
Contingencies	0	0	4	„
TOTAL .	1	0	0	„

"The grass delivered at Calcutta realizes from R1-4 to R1-10 per maund. The rates at Chaibassa are as follows :—

"Unmanufactured grass, 3 bundles (= about ½ seer), 3 pies.
Rope, per bundle (= about ¼ seer), 6 pies."

As regards Palamau, Mr. Quinnell says :—

"The Sabai grass is fairly plentiful in this division. It is not met with so frequently, or in so great quantities, as in Singhbhum, and it has little marketable value at present. It flourishes in broken ground on the sides of the hot dry nallahs so frequently met with in open Sâl forests, and tufts of this grass may be seen in fissures of clayey ground, which has been caked by the heat, where no other grass can maintain an existence. The chief uses to which this grass is applied locally are—

"(*a*) for ropes, for the rope work of bedsteads, for drawing water from wells, for tying on thatch, for attaching the yoke to the necks of plough cattle, for dragging clod crushers, for tying branches which form the fencing of fields, for making small fixing nets and nets for catching birds, for tying together and towing bamboo rafts, etc. etc. The rate is from 2½ annas to 3 annas per seer, according to thickness of rope.

(*b*) for small brooms. These are sold at 6 and 8 to the anna.

(*c*) for making "moras" or large receptacles for grain. These are not sold in the bazars, but are made by villagers as occasion requires

"The bazar rate for the grass itself is one anna per bundle, about 9 inches in circumference, four of which go to the seer. The existing rates for Sabai grass from the reserved forests of this division are 3 pies per head-load and 4 annas per cart-load. The export at present is very small, and there is little local demand from Government forests, as there is an ample supply of the grass in village forests. 'Mallahs,' a class of men who trade in bamboo and catechu, float down small quantities on their bamboo rafts to the markets above mentioned between the months of July and December, when there is sufficient water in the Koel river. With the removal of obstructions in the Koel river and the improvement of communications generally, there is no doubt that there will be a considerable increase in the amount exported."

In the Sonthal Parganas the grass is common, and is very largely used by the Sonthals, who also, as the present writer has seen in several places, cultivate it for their own use. In the Proceedings of the

Agricultural and Horticultural Society of India for October 1887 the Revd. H. P. Boerresen of Rampore Hât, wrote as follows on the subject :—

" The Sabai or Babui grass yields two crops in the year—one in September and the other at the end of October or early in November—without any irrigation, as the rainy season is then prevalent. It might yield a third cutting if irrigated; but I cannot say anything on this head, never having made the experiment, nor have I seen it attempted by others.

" I believe it will grow anywhere, as we have transplanted it from here to all our other outstations in the Sonthal Parganas, and it thrives in them all. The Sonthal Christians have also taken some of it to our Christian colony in Guma Duar, Assam, where it also grows well.

" I have never attempted to propagate it by seed, but always by roots. When a clump or tuft is dug out, it may be divided into as many small divisions of roots as one pleases; and these are put down again in rows about 3 feet from one another, and the same interval between each root planted. It will yield a very trifling return the first two years, but by the third or fourth year, when the roots have spread and multiplied, it gives a good crop. The plot on which it is planted must be kept free from other grass. When it is seven or eight years old, the roots should be beaten down with wooden mallets, or a plough should be run through them in every direction, and fresh earth thrown over the whole increases the yield. If not treated in this way it will cease yielding any crop. When grown too old, it must be taken up entirely, re-divided in small bunches of roots, and transplanted to a fresh locality.

" We brought the grass always in local *hâts* for roofing purposes (as rope) before we grew our own, and nowhere in our neighbourhood am I aware of its being cultivated in any but very small patches by a solitary man here or there. It is not cultivated as a source of income or trade, so that I am unable to say where the roots may be bought or at what price. We got a small quantity of the roots originally from a Hindu village, but by fostering and spreading their cultivation have now a considerable quantity. It should be planted in a dry spot where no water lodges, as experience has shown in one of our stations, where the water oozed up from below and rotted the roots so that it would not grow there. A sloping site is probably the best.

" When we first started the mission here we had to pay R4 a maund in the hâts for the grass in order to twist it into rope or string, and it was the having to pay so much that led me to try and cultivate it ourselves. The grass runs to seed in the hot months shortly before the rainy season, but these must be cut off and removed or the crop will deteriorate."

In regard to its growth and the trade in it in the Madras Presidency, Mr. E. D. M. Hooper, the Conservator of Forests of the Northern Circle, writes as follows, chiefly in regard to the Ganjam District, where the grass is extremely common, and where many attempts have been made, both by Government and by private firms, to bring it to the Calcutta market. Nearly all these attempts failed owing to the heavy charges for freight made by the British Indian Steam Navigation Company :—

" I send you the following extract from a letter received from Ganjam regarding Babuli grass.

" When Mr. A. W. Lushington was Divisional Forest Officer, a quantity of grass was collected and sent to Calcutta. The experiment was not a success, and I am given to understand that the chief obstacles were—

" *1st.*—The small quantity obtainable and the limited period in which it was procurable.

2nd.—The inferior quality as compared with the sample sent.

3rd.—And, chiefly, the enormous cost of transit from where it is procurable to the coast and freight to Calcutta.

"I have made enquiries, and estimate the cost as follows :—

	Per ton. R	a.	p.
"1. Cost of collecting and delivery in Russelkonda	5	5	0
2. Carriage to Gopalpore	11	8	0
3. Pressing in Gopalpore	5	0	0
4. Freight to Calcutta	6	0	0
5. Incidental expenses	2	0	0
Cost per ton delivered in Calcutta	30	0	0

"I calculate that we could collect during six or seven months in the year, and during this time we could deliver in Russelkonda about 800 tons, but, so long as we have the very high transit charges to the coast, I do not think it would pay. A press in Russelkonda would be advantageous. It would save us 50 per cent transit charges, besides reducing charges in pressing. With a press in Russelkonda, I think we could deliver in Calcutta at about R23 per ton. I cannot find out what we could get for grass per ton in Calcutta A private press says that they now lay down a press, building included, for about R3,000 to R3,500, to turn out 20 to 25 bales a day if we would undertake to deliver to them in Russelkonda about 1,000, tons of grass yearly.

"The best thing to do would be to get some private firm either to pay us so much the cart-load of grass removed by them from the forests or take delivery from us in Russelkonda.

"We are trying to find out what market there is for the grass in Calcutta, and I will let you know later on what can be done here.

"From Godávari I learn that one viss or 3lbs. of the rope sells for two annas, and the material is chiefly used in native bedsteads. It is further stated that the grass is only found in patches along the Agency border of the district, and so distributed, that the quantity available could not be brought to a central press with profit."

The following information has been communicated by Mr. C. D. McArthy, District Forest Officer of Vizagapatam :—

"This product is known in the northern parts of the district under the name of 'Kopiri' grass. It is found in the forest at the foot of the Palkonda Agency hills, and also on the 1,500-foot plateau above.

"The cutting is done from October to December, but the later the cutting, the less useful is the grass on account of increased brittleness.

"A kavadi-load of green grass weighs about 50lbs., and fetches from 4 to 5 annas in the villages close to the forest. The grass is utilized only for the manufacture of ropes. It is first dipped in water for about an hour, and is then beaten with sticks with the object of separating out the fibre, which is then made into ropes of various thickness.

"Fine rope is used by the poorer people for cots, and is sold in coils of 3 to 4lbs., sufficient for one cot, for one 1½ annas.

"Stouter rope, about 2½ inches in girth, is used by ryots for binding bundles of seed paddy and other grains, and also for cattle ropes."

All the information collected goes to show that the grass is a valuable product for paper-making, and that it can be easily cultivated if necessary. The Deccan Paper Mills are about to try the cultivation with roots obtained from the Siwaliks. As an article of export trade, it is doubtful if it will ever come into much use owing to the long distances of land transport which will be necessary and its comparative bulk even if pressed, but for Indian paper-making it has most probably a great future before it, and it deserves to be widely known and utilized.

J. S. GAMBLE,

Conservator of Forests, School Circle,

N.-W. P. and Oudh.

G. I. C. P. O.—No. 16 R. & A.—9-9-93—720.—W. L. W.